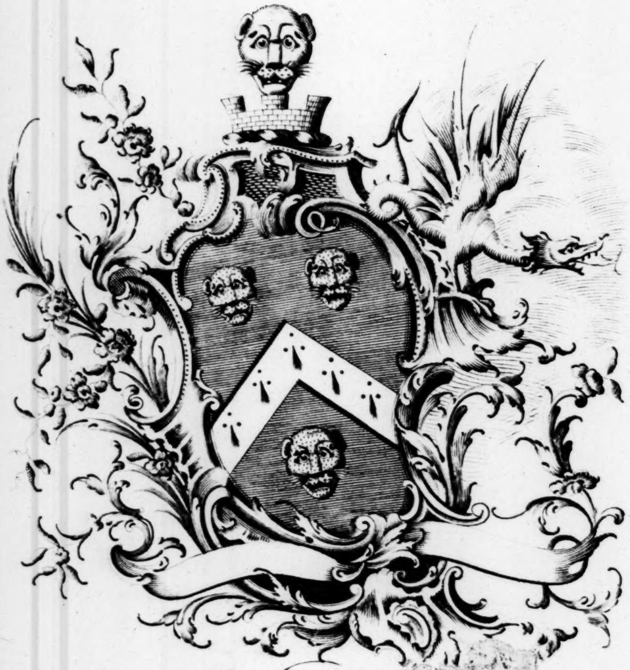

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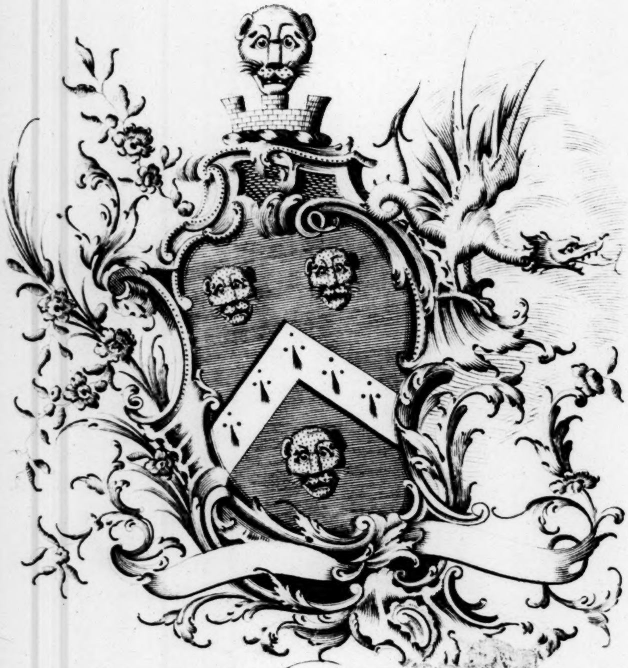

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Dupl.

THE SUBTIL MEDIUM PROV'D:

OR, THAT

Wonderful Power of Nature,

So long ago conjectur'd

BY THE

Moſt Ancient and Remarkable Philoſophers,

Which they call'd ſometimes

ÆTHER,

But oftener

ELEMENTARY FIRE,

VERIFY'D.

Shewing, That *all* the *diſtinguiſhing* and eſſential Qualities aſcrib'd to Æther by them, and the moſt eminent modern Philoſophers, are to be found in electrical Fire, and that too in the utmoſt Degree of Perfection.

GIVING

An Account not only of the Progreſs and ſeveral Gradations of Electricity, from thoſe ancient Times to the preſent;

But alſo accounting,

Firſt, For the natural Difference of electrical and non-electrical Bodies.

Secondly, Shewing the Source or main Spring from whence the electric Matter proceeds.

Thirdly, Its various Uſes in the animal Œconomy, particularly when apply'd to Maladies and Diſorders incident to the human Body. Illuſtrated by a Variety of known Facts.

Fourthly, The Method of applying it in each particular Caſe. And,

Laſtly, The ſeveral Objections brought againſt it accounted for and anſwer'd.

By R. LOVETT,

Of the Cathedral Church of *Worceſter*.

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BRITISH MUSEUM
17 SEP 63

TO THE READER.

As no ſmall Part of my Time and Thoughts have, for ſix or ſeven Years paſt, been employ'd in electrical Experiments, and particularly ſuch Experiments as were found to have ſalutary Effects on the animal Œconomy, when apply'd to Diſorders, incident to the human Body; ſo, I am fully ſatisfy'd, the more they are enquir'd into, the more wonderful they will appear: And, obſerving a Series of ſuch ſalutary Effects, I was determin'd to publiſh ſomething of this Kind, in Hopes to excite others, of greater Abilities and more Leiſure, to purſue the ſame laudable Practice, being thoroughly convinc'd Mankind would find their Account in ſo doing.

But, before I ſet about it, I conſider'd, that, to ſhew I proceeded on rational Principles, ſomething ought alſo to be ſaid concerning the Nature and Qualities, in general, of the ſubtil Agent, which was the Cauſe of ſuch ſalutary Effects; and not only ſo, but alſo endeavour, in a rational Way, to explain the Manner of its Acting, that ſo it might appear agreeable to Reaſon to expect the great Things from it, which I was going to relate: This muſt be the *firſt* and chief Apology for the following *Eſſay*. And the

Second, Becauſe I had obſerv'd, that not a few, even of the judicious Part of Mankind, ſeem'd thoroughly perſuaded, that the electrical Phænomenon was of ſo abſtruſe a Nature, as to be ſcarce explicable on any rational Principles whatſoever.

Thirdly, Becauſe no Pen whatever had, I thought, purſu'd the Subject ſo thoroughly as might have been wiſh'd: Thoſe who had wrote their Thoughts concerning its Nature, Properties, and Production, being, for the moſt Part, quickly after the late great Improvement or Diſcovery of the Shock; for this Reaſon, they ſeem'd to have done it too precipitantly, and perhaps the Subject was treated too ſuperficially; becauſe here they ſtopp'd, altho' there was ſufficient Room to have proceeded ſtill much farther*: Theſe were undoubtedly the Reaſons why it was not more fully explain'd, before this Time, at leaſt, ſo as to have left leſs Room to pronounce it inexplicable; particularly as many of the Gentlemen who wrote their Thoughts on Electricity, were poſſeſs'd both of eminent Parts and great Learning, and therefore far better qualify'd to undertake it than I could pretend to be, who, I muſt confeſs, am quite unequal to the Taſk. And muſt therefore,

Fourthly, Beg to be excus'd for preſuming to undertake it, who am unhappily depriv'd of thoſe acquir'd Abilities of polite Education, which are, in the Eye of the World, thought neceſſary to draw the Attention of others, or raiſe their Expectation of Succeſs: But, as an ingenious Author hath very juſtly obſerv'd, Truths, Facts, and demonſtrative Experiments are no Slaves to *Latin* and *Greek*, whatever *Men* are; therefore, ſo much as can be plainly and clearly made appear by one in ſuch a Situation as the Author, will be allow'd to be the Effect of undiſguis'd Truth only, as depending principally on Facts.

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* My Meaning is: The Experiments and Chain of Reaſoning thereon were diſcontinu'd, before a competent Number of ſuch leading Experiments were made as were neceſſary to conduct to a more clear Diſcovery of the Cauſe that produc'd ſuch a wonderful Phænomenon.

But as it will be obvious to all, that great Difficulties muſt occur to one thus circumſtanc'd, more than to ſuch as are accuſtom'd to write; ſo it is hoped the candid Reader will make ſuitable Allowances.

My Meaning is, that the Style and Diction may be excus'd, if it does not always keep up ſtrictly to the Nicety of Grammar Rules, ſuch as a falſe Point, a ſmall Tautology, an unphiloſophical Term, or even an undue Connection; yet, I ſhall not, I hope, be deny'd the Advantage of a fair Hearing, as far as I can be ſupported by plain Facts and Experiments.—And, that there might not ſometimes ſeem a Chaſm, when I, perhaps deſign'd a Connection, was the chief Reaſon for my writing by Way of *Dialogue*.

As to the Subject-matter, I neither expect or deſire any other Favour, than ſuch a candid Hearing; for, as the Reaſoning is chiefly founded on proper Experiments, it is preſum'd, that Part will be found capable of ſupporting itſelf.

In order, therefore, to proceed on the moſt rational Principles, and to ſhorten the Work as much as poſſible, I have not only taken Sir *Iſaac Newton* for my Guide, whenever it was conſiſtent with what I was explaining, but have alſo taken for granted whatever he has deliver'd on the Subject of a univerſal Æther, as to its Nature, Properties, and great Utility; and then proceeded by Way of *Quæries*, and Proofs by Experiments; and, where Experiments could not be fairly produc'd, have endeavour'd to account for it by the moſt rational Arguments alone.

But perhaps it may be thought, that the greateſt Reaſon of all, for an Apology, ought to be for my advancing ſome Things which may appear a little heterodox, and ſomething different from certain Philoſophical Points, which, for a conſiderable

Time paſt, have been ſettled, as undeniable, by the greateſt Philoſophers. Whereas,

If I were allow'd to ſpeak my Mind freely, it is my humble Opinion, that, were thoſe great Philoſophers ſtill living, to ſee the wonderful Experiments which are made in Electricity, they would not be ſo tenacious of their former Opinions, as to think there was not ſufficient Reaſon, now, for altering many of their Sentiments, how differently ſoever their preſent Diſciples or Devotees may think or act.

Thoſe great Philoſophers, notwithſtanding their former ſettled and undeniable Principles, would, no doubt, after ſo grand a Diſcovery, have ſet to work, and new-modell'd many of their philoſophical Plans, or erected new ones, in order to have penetrated ſtill deeper into the Receſſes of the Works of Nature, and, if poſſible, to have really accounted for ſome Things, which, before ſuch Diſcovery, were judg'd inexplicable.

I have made Uſe of the Terms, *Fire*, *Electricity*, *electrical Fire*, *electrical Æther*, *ætherial Spirit*, &c. as ſynonymous.

Sometimes, when ſpeaking of the Conveying or Leading-wire of the Condenſing-phial, I have call'd it by that Name; ſometimes, the hooked Wire of the Condenſing-phial; at other Times, the Wire piercing the Cork of the Condenſing-phial, juſt as they occur'd when I was writing; my chief Aim being, not ſo much a Compleatneſs of the Diction, as the Delivering myſelf in an intelligible Manner.

INTRODUCTION.

On the ſeveral Gradations of the Progreſs of ELECTRICITY.

THE Term *Electricity* explains itſelf, being deriv'd from *Electron*, which is the *Greek* Name for Amber, and the Thing is of great Antiquity.

The Ancients, ſo long ago as the Days of *Pythagoras*, according to ſome, and very probably long before, were not unacquainted with that Property in Amber, of attracting light Bodies when lying in the Sunſhine, but more particularly after rubbing it; perhaps from rubbing an Amber Bead, or the like; for which Reaſon all other Things, that were afterwards found to be endu'd with the like Qualities of Attraction, *&c.* were call'd Electrics, and all others, Non-electrics.

The Reaſon why Electricity made ſuch ſlow Advances, in the experimental Way, for ſo many hundred Years, was, from their not knowing that it eſcap'd thro' almoſt all Bodies into the Earth; and more particularly from their not knowing that all ſuch Bodies, which are now call'd Electrics *per ſe*, were the only Bodies which could prevent ſuch Eſcape.

Of Bodies which are endu'd with this Quality, Glaſs is found to be one of the greateſt of all, even much to exceed Amber itſelf; and, when this was diſcover'd, it might very well be look'd on as no ſmall Improvement; for, when this Power was obſerv'd ſerv'd to be ſo increas'd, they not only found that it had a Property of Repelling, equal to that of Attracting, but alſo that it was real Fire.

A ſtill greater Improvement was, the actual Diſcovery that Glaſs, Amber, Reſin, Wax, Silk, Hair, and all other electric Bodies, did not convey this electric Matter to other Bodies, nor ſuffer it to make its Eſcape thro' them; for ſoon after this, it was diſcover'd, that by ſupporting a non-electrical Body with Electrics, the electrical Fire could be convey'd inſtantaneouſly to any Diſtance upon any Perſon, or other non-electric Body thus ſupported, ſo that any Part of them ſhould act as powerfully as the Gun-barrel or Tube itſelf.

Theſe important Diſcoveries were firſt made by Mr. *Stephen Gray*, one of the Penſioners belonging to the *Charter-houſe*; who ſpent moſt of his Time in making electrical Experiments, and who may juſtly be allow'd, from the great Variety of thoſe made by him, to be the principal Perſon who ſet on foot all the late Diſcoveries and Improvements: Many of his Experiments were communicated to the Royal Society, and were look'd on as ſuch extraordinary Performances, as to merit a Place in the Philoſophical Tranſactions.

It is to his Experiments we are indebted for ſuch clear Hints concerning its Nature and Properties, as to excite numbers of the Curious to purſue the ſame Clue, and which conducted to ſuch leading Experiments, particularly of its almoſt inſtantaneous Motion to the moſt diſtant Parts; he himſelf having prov'd it to be ſenſibly inſtantaneous, to the Diſtance of 800 Feet.

It was he who diſcover'd it to make, if poſſible, its Eſcape into the Earth; to prevent which (he having before diſcover'd, that what are call'd Electrics *per ſe*, would prevent ſuch Eſcape) and to cauſe it to remain on any particular Perſon, his

Method was to ſuſpend him horizontally on two hair Lines; then rubbing his glaſs Tube, and holding it near his Feet, his Face or Hands were inſtantly capable of attracting and repelling light Bodies.

He alſo afterwards diſcover'd, that, if a Perſon ſtood on a Cake of Reſin, Glaſs, or any other electrical Subſtance, it was equally the ſame as ſupporting him with hair or ſilk Lines.

A greater Improvement, yet, was the introducing of the glaſs Globe, Cylinder, and Spheroid, whirling on their Axis, inſtead of rubbing the glaſs Tube; for by that Means they obſerv'd the Power increas'd to a very high Degree.

Thus having brought it to ſuch Perfection, a great Number of various Experiments were every where made; particularly after it was diſcover'd ſo plainly to be Fire, as to kindle up many particular Bodies into an actual Flame.

But the greateſt Improvement of all, and what conducted to the finiſhing Stroke, was the accidental and ſurpriſing Shock, diſcover'd to Profeſſor M. *de Muſchenbroek* of *Leyden*: An Account of which was communicated in a Letter from *Paris*, and was as follows:

" *Mar.* 25th, 1746. M. *de Muſchenbroek*, a fa-
" mous Profeſſor of experimental Phyſics at *Ley-*
" *den*, has wrote a Letter to M. *de Reaumur*, of
" the Royal Academy of Sciences, containing an
" Account of a very ſingular Experiment, which
" has led him to ſeveral Diſcoveries concerning
" Electricity."

The Experiment.

" HAVING ſuſpended an iron Cannon hori-
" zontally, upon ſilken Cords, with one
" End near the electrical Globe, he faſtened to the
" other End a latten Wire, which deſcended into

" a Bottle half full of Water; that holding up the " Bottle with one Hand, while the Cannon was " electriſing, he put forth a Finger of his other " Hand towards the Piece, in order, as uſual, to " draw off a Spark, but was ſtruck ſuch a violent " Blow, that he thought his Life was at an End; " and adds, that, eſteeming himſelf very happy in " eſcaping, he had no Mind to repeat the Experi- " ment, and that the Commotion he felt was like " a Clap of Thunder.

" As this Letter came at a Time when many " learned Men were employ'd about Electricity; " the Abbé *Nollet* and M. *de Monniers*, of the " ſame Academy, zealous to ſearch into ſo extra- " ordinary a Phænomenon, diveſted themſelves of " Fear, made the ſame Experiment as M. *de* " *Muſchenbroek* had done, and, in like Manner, " found the Commotion very terrible." London *Evening Poſt*, April *the* 1*ſt*, 1746.

This ſudden and wonderful Diſcovery amazed the whole *European* World for ſome Time; for, before this, very little, if any Power or Force was perceiv'd in it, or even ſuſpected; ſo that now it appear'd ſo much to exceed the Power of what was found in it before, as to bear ſcarcely any Manner of Proportion; for inſtead of being ſtrong enough to be felt to puſh againſt the Finger (which, before this, was counted a great Matter) it was then found much more capable of moving a Mountain, and, from the great Number of Experiments which were ſoon made in all Places, the Progreſs of its clearer and clearer Diſcovery was, from that Time, exceedingly rapid.

But, notwithſtanding all this wonderful Power was diſcover'd in it, many were ſtill inclin'd to account for its Production in the old Way, and after the ſame Manner as when it appear'd in its feeble State, believing it to be emitted by the electrical

Globe: And though ſome of the more Judicious gave it, as their Opinion, to be no other than the Æther of the modern Philoſophers, and others, the elementary Fire of the Ancients; theſe were ſeverely laſh'd for it; ſo greatly are Prejudice, and confirm'd Habits, obſerv'd to prevail, even with the moſt ingenious Part of Mankind.

A Deſcription of the Condenſing-phial.

THIS Phial, being of the greateſt Importance in making electrical Experiments, worthily merits a particular Explanation. Without this, or a like Contrivance, ſcarce any other Way could have been invented or thought of, capable of entrapping, arreſting, and impriſoning this mighty Agent, long enough to make the Experiments.

If this had not been wonderfully reveal'd to us, we had ſtill been ignorant of any great Strength, Power, or Force, in electrical Fire.

The Way and Manner this great Secret was reveal'd to M: *de Muſchenbroek*, was, as before-mention'd, by Means of a Phial partly fill'd with Water; for which Reaſon all were at firſt prepar'd in that Manner: *Viz.* A Phial, nearly fill'd with Water, was ſuſpended to the Gun-barrel by a hooked Wire, leading through the Cork to the Water, whereby this inviſible Fire was convey'd to it; this Principle, prevailing in the Non-electrical denſe Water, immediately conveys it to the Glaſs, in which the contain'd Æther remains ſo fix'd, as is not eaſily remov'd; and with which this electrical Æther appears to be moſt intimately connected: This is imagin'd to be the Reaſon it is ſo ſtrongly attach'd to the Glaſs, as oftentimes not to return by the Way it came for a long Time afterwards. I once heard an Operator in Electricity affirm he had ſent one of theſe royal Priſoners, thus confin'd, near a Mile, which afterwards burſt through, both his Priſon and Keeper, giving him a Blow on the Elbows at Parting.

Mr. *Rackſtrow*, in *Fleet-ſtreet*, kept this Fire in a Phial, with Water, for ten Hours, and others, a longer Time, but Mr. *Monniers* kept it ſo for thirty-ſix Hours; and every Operator in Electricity very well knows that this pure Fire may be kept in cloſe Connexion with Water for a long Time, particularly if the Water be made and kept warm.

The more denſe the Fluid contain'd in the Phial, the more Power there appear'd of holding it together; for, when it was furniſh'd with Mercury, inſtead of Water, ſo much was oftentimes detain'd as to burſt of its own Accord.

Afterwards, the common Method, in forming thoſe electrical Magazines, was to make Uſe of braſs or iron Filings, inſtead of Liquids, and coat the Outſide of the Phial with a thin Plate of Lead; which was found to be ſtill better.

But the moſt commodious Way is to line the Inſide of the Phial with Gold-leaf, *&c.* and to coat it with Tinfoil, thin Lead, or the like, and to faſten ſome Tinſel-fringe to the Bottom, or the End of the Wire within the Phial, ſo as to reach to the gold Lining, by which Means the electrical Fire is convey'd to it.

It is not very material what Form the Glaſs is of; to prove which, and to ſhew the exceeding great Power of this Fire, when more is collected, by enlarging the Glaſs, I ſhall mention what Mr. *Rackſtrow* ſays, after he had been giving his Opinion of the Way and Manner in which he conceiv'd Lightning and Thunder to be generated:

" I ſhall now endeavour farther to ſhew the Si-
" milarity of Thunder and Lightning to Electri-
" city. The ſurpriſing violent Shock that is to
" be given, even in a Degree greater than they can
" well

" well bear, to any Number of Perſons at once, " is ſufficient to ſatisfy us, that the Electricity, paſ-" ſing through a Tree in the ſame Manner, muſt " ſhock the Solids thereof, as it does the Animal " Body. If we could collect a great deal more E-" lectricity, we might ſplit the Tree, as we burſt " the Veſſels in Animals kill'd by Electricity; " whoſe Bodies look livid, as when killed by " Lightning.

" Mr. *Watſon* communicated the following Ex-" periment to me, and ſhew'd me ſuch a large " Glaſs as I am about to deſcribe; but his was " broke. He took the Hint from Dr. *Bevis*, who, " for the ſame Experiment, made Uſe of a flat " Glaſs, gilt on both Sides, excepting a Margin " round, no Matter what Form. This Glaſs, " that was ſhewn me, was blown very thin, in the " Shape of a Cylinder, like a Confectioner's, open " at Top, and gilt both on the Inſide and Outſide " to within two Inches of the Top. I cover'd " mine, which was about twenty Inches high, and " ten Diameter, with gilt Leather, as high as it " was gilt; which preſerv'd it from breaking, and " made it act the ſtronger. The Metal within ſuch " a Glaſs as I have deſcrib'd, when electrified, will " act with greater Vigour than 25,000 Times its " own Weight of iron File-duſt in Bottles electri-" fied; which proves that it is from the Number " of the Points in Contact that it comes to act ſo " ſtrongly, and not from the Quantity of the Me-" tal. I let a Piece of Chain hang down from the " Tube which I had electrified, to electrify the " Metal within the Glaſs; I made Uſe of another " Piece of Chain, about ten Yards long; one " End of which I laid under the Bottom of the " Glaſs, and the other End I held to the Tube " electrified, to cauſe the Exploſion, which was as " loud as the Report of a Piſtol, and the Flaſh of

"Light ſo very bright, as to dazzle the Eyes of the
"Beholders; the whole Chain that led the electrical
"Exploſion was not only illuminated, but
"darted Fire in moſt Directions; the Report,
"though as loud as that of a Piſtol, was not ſo
"ſhort, but more like that of Thunder. The firſt
"Time I tried this Experiment, I thought it had
"broken the Glaſs to Pieces. In Places where
"the Chain communicated, I have in a proper
"Manner, in one Place, put warm Spirits of
"Wine, in another File-duſt, Vitriol, and Water
"mixed together, ſome Oil of Turpentine in a
"Third, and, in trying the above Experiment, all
"theſe different Things would take Fire together;
"which is a Proof, that Electricity is capable of
"ſetting Fire to all ſulphureous Exhalations or Va-
"pours in the Air; and, thoſe combuſtible Clouds
"taking Fire one after the other, their different
"Exploſions cauſe the ſucceſſive Noiſe of Thun-
"der." Mr. *Rackſtrow*'s *Eſſay*, p. 65.

A ſhort Introductory
DIALOGUE
ON THE
NATURE and PROPERTY
OF
Electrics and Non-Electrics.

B. WHAT muſt we ſuppoſe to be the Cauſe of thoſe remarkable Qualities, ſo different in different Bodies, termed original Electrics, and Non-electrics; or, as they are now term'd, Electrics *per ſe*, and Non-electrics? And what Kind of Bodies are the moſt remarkably ſo?

A. The circumambient Atmoſphere is obſerv'd to be one of the moſt remarkable of all original Electrics, and the Body of the Earth as remarkable and powerful a Non-electric.— But of theſe farther on.

B. I ſhould be glad to be inform'd in what Manner the electrical Fire is ſuppos'd to be conducted by theſe Non-electrics?

A. Theſe Conducters, as they are called, are ſuch Bodies only, in whoſe Pores, the original Æther ſtands ſo looſe as well as rare, as to be freely driven on by the firſt Impulſe, and thus makes Room for the Flux, of this newly collected electrical Æther, which preſſing, by accumulating on it, drives it forward, and then poſſeſſes its Place, and may be reaſonably ſuppos'd to execute the ſame Office; and, as this will conſtantly and invariably appear to be the Caſe, I ſhall make Uſe of no more Words to explain it, till I come to the Experiment which proves it.

B. What is thought to be the Cauſe of that particular Quality in thoſe Bodies, termed Electrics *per ſe?*

A. Electrics *per ſe* are ſuch Bodies, in which the original Æther ſeems to be more fix'd, and, conſequently, cannot move freely on, to make Room for the newly collected electrical Æther to take Place, as in the former Caſe: The moſt probable Conjecture for its Prevalency, and what ſeems moſt agreeable to Reaſon and Obſervation, is, from a particular inherent Texture of the Parts of ſuch Bodies, ſaturated, no doubt, with this Principle, in the firſt Formation; of which, among Animals, the *Torpedo* or numbing Fiſh is accounted, by many, the moſt remarkable, and the ſenſitive Plant among Vegetables.

But the moſt compleat of any, of ſuch Bodies, ſeem to be thoſe form'd of the minuteſt Particles or Effluvia of Bodies; which minute Particles incorporate as it were, or adhere in ſo remarkable a Manner to the ætherial Particles, that they are not eaſily diſunited, but by the Action of the electrical Machine; or elſe otherwiſe greatly agitated: A Quantity of theſe, when form'd into one Maſs, are obſerv'd, in the Experiments, to be the moſt remarkable.

Of this Sort is the common Air, which appears to be ſuch a Mixture of this Æther, and the earthy Exhalations adhering and uniting ſo firmly with it, as to be perhaps the greateſt Electric *per ſe* of any Thing in Nature; for, though a ſmall Part of this Fire ſeems to be ſeparated from, and collected out of the common Air, yet it ſhews the utmoſt Reluctance towards Returning into it again, and as we ſhall ſoon find as great a Propenſity to return into the Earth, after being conducted to the Gun-barrel, or any other Non-electric, ſupported with original Electrics; ſo that the Air, particularly a dry Air, ſeems ſo ſaturated with it as ſcarce capable of receiving more.

B. What other Bodies are the moſt remarkable Electrics?

A. All unctuous inflammable Bodies, in general, appear to be ſaturated with this Fire, and alſo fix'd as abovemention'd: And of inflammable Subſtances thoſe of the fragile Kind, and ſuch as break with a Poliſh, ſeem to poſſeſs this Quality the moſt; as Reſin, Pitch, Sealing-wax, &c. Sulphur alſo, and Bees-wax, though they do not break with ſuch a Poliſh as the reſt, yet are they very remarkable Electrics, particularly the Former.

Alſo Glaſs, Amber, and ſome other hard brittle Bodies, although not of an inflammable Quality, are yet the moſt noted in the whole Claſs of Electrics; they are therefore in all Probability ſaturated beyond other Bodies with this Fire, which remains alſo fix'd.

And, laſtly, there is yet another Kind of Electrics *per ſe*, of a more ſoft Texture; ſuch as Silk, and the Hair of many particular Animals; alſo many Inſects, as Bees, Flies, Moths, *&c.* beſides many other animal Subſtances, when dry.

Two chief Reaſons why ſuch ſoft Bodies as Silk, the Hair of Cats, *&c.* are ſuch remarkable Electrics,

trics, are moſt probably; firſt, that they are ſaturated with this Principle in their Formation, and alſo fix'd as above; ſecondly, being of ſo looſe a Texture, their Pores or Interſtices are ſo large, as to admit of the common Air, which is always obſerv'd to be the greateſt Impediment to the Motion of the pure Æther; and this ſeems to be confirm'd, by obſerving how, when their Pores are fill'd up, by ſoaking them in Water, they are at once converted into vigorous Non-electrics; ſo that here, as the denſe Water, whoſe Pores are ſo ſmall as not to admit the coarſer Æther, or Air, but the finer Æther only, the Whole, to Appearance, is become a Non-electric; but, as this can in no wiſe alter the Nature of the Body itſelf, ſo it can be no other than a proper Vehicle which admits of the finer Æther only, wherein the inconceivable Strength and Energy lies.

For the like Reaſon, many Vegetables, which, when green, and replete with Juices, appear to be very powerful Non-electrics; yet that Power, as they become more dry, is found more and more feeble, particularly thoſe which are of the moſt light and looſe Texture; and in Cork very little, if any of that Quality remains, though no doubt but that too, like other Vegetables, when green and full of Sap, was as great a Non-electric as the reſt.— It appears then, that, if the Æther be fix'd in the Body, it then muſt conſtitute an Electric; if not fix'd, then a Non-electric.

B. But why do you not rather imagine that ſuch Bodies as Amber, Glaſs, Reſin, Sulphur, *&c.* being ſo ſaturated with this electrical Fire, is the Cauſe of our Seeing it thrown out in ſuch Plenty in the ſame Manner as has been imagin'd?

A. Becauſe, were it ſo, and if the Glaſs could eaſily part with it, like a Non-electric Body, there would be no electrical Fire produc'd from it, any more than from a Globe of Metal; it muſt be own'd, *that* was the common Way, at firſt, of accounting for its Production; and that the electric Matter, inherent in the glaſs Globe, was put into ſuch a vibrating Motion by the Attrition of the Hand or Cuſhion on the Outſide of it, while in Motion, as to be thrown out thereby in ſo copious a Manner; but this Way of accounting for its Production, not agreeing with Experience, was therefore exploded: That the Æther is really fix'd in them, beyond what it is in other Bodies, ſo as not to ſuffer the newly collected Æther to move through them ſo freely as through Non-electrics, may be prov'd by Numbers of Experiments,—and if the circulating Experiment, *viz.* Experiment the IVth, be attempted, and the Circuit be divided in any Part by the Interpoſition of the leaſt Piece of Glaſs, it will not ſucceed.

And though theſe Particles of Æther contain'd in Glaſs, Amber, &c. ſeem ſo fix'd as not eaſily to be mov'd out; yet does it appear capable of being agitated and put in Motion, even by the ignited Æther or ſolar Rays only, ſo as to act at ſome Diſtance from the electrical Body; it being obſerv'd that a glaſs Tube, having only been ſo long expos'd to the Sun, as to acquire a ſmall Degree of Warmth, will attract light Bodies.

Note. What is here call'd Attraction is conceiv'd by many to be perform'd rather by Preſſure, thus:

When the Power or Force of the excited electrical Body is extended to any Diſtance from the Body; all Parts contain'd within that Diſtance, are by the Action of the Æther become more rare than the Parts ſurrounding it; by which Means the groſſer Air, preſſing to reſtore the Balance, drives thoſe light Bodies towards it.

DIALOGUE II.

B. HOW came it to be firſt known, that ſuch a ſubtil Medium actually exiſted ?

A. By its Effects only, before it was more clearly prov'd by Means of Electricity.

B. Can it ſeem credible that there ſhould be no other Means of diſcovering it, notwithſtanding it was deſcrib'd with moſt of its great and eſſential Qualities ?

A. However incredible it may ſeem, yet nothing is more ſure ; for no ſuch Agent could ever be demonſtrated to the Senſes, till it was perform'd by Means of electrical Experiments.

B. Who was the firſt Diſcoverer of the Exiſtence of ſuch a ſubtil Medium in Nature, and how long ſince the firſt Diſcovery ?

A. It is ſomething uncertain who was the firſt Diſcoverer, but we are aſſur'd from Hiſtory, that it was known by the ancient Philoſophers, ſome thouſand Years ago, who not only diſcover d the moſt eſſential Properties aſcrib'd to Æther by all the greateſt Philoſophers ever ſince, but they alſo diſcover'd it to be an inviſible Fire ; all which agrees with this electrical ſubtil Medium.

They alſo pronounc'd it an Element, which is now the Opinion of many Moderns likewiſe, particularly ſince the late great Improvements in Electricity.

The Ancients not only thought themſelves ſure of the Exiſtence of ſuch an univerſal ſubtil Medium, but they alſo aſcrib'd to it the greateſt Power and Efficacy ; for, according to thoſe Philoſophers, it was the moſt neceſſary mechanical Agent of all created Beings.

The Æther of *Des Cartes* was his *Materia ſubtilis*, or his firſt Element ; by which he underſtood

ſtood a " moſt ſubtil Matter very ſwiftly agitated, " fluid, and keeps to no certain Figure, but which " ſuits itſelf to the Figure of thoſe Bodies that are " about it.

" His ſecond Element conſiſts of ſmall Globules; that is, Bodies exactly round and very " ſolid, which do not only, like the firſt Element, " fill up the Pores of Bodies, but alſo conſtitute " the pureſt Subſtance of the Æther and Heaven." Blome's *Tranſlat. of* Des Cartes's *Philoſ.* p. 101.

Æther, according to Sir *Iſaac Newton*, is a thin ſubtil Matter, much finer and rarer than Air.

Sometimes term'd a ſubtil Spirit, as in the latter End of his *Principia*; and ſometimes a ſubtil ætherial Medium, as in his *Optics*.

To ſay the Truth, there were Abundance of Conſiderations, which ſeem'd to evince the Exiſtence of ſome Matter in the Air, much finer than the Air itſelf; and an unknown ſomething always remain'd behind, when the Air was taken away, as appear'd from certain Effects which were produc'd *in Vacuo*.

This Æther was ſuppos'd to be univerſally diſpers'd, ſo as to fill up all the Parts of Space, even all that Space, which is, by ſome others, term'd the immenſe Void; and not only ſo, but all the Interſtices or minuteſt Pores of the moſt denſe and compacted Bodies.

" The Exiſtence of ſuch an univerſal ætherial " Medium being ſettled, Sir *Iſaac Newton* pro- " ceeds to its Properties, inferring it to be not " only rarer and more fluid than Air, but ex- " ceedingly more elaſtic and active: In Virtue " of which Properties he ſhews that a great Part " of the Phænomena of Nature may be produc'd " by it, as Gravitation, *&c.* to its Elaſticity he " attributes the elaſtic Force of the Air, and of " nervous Fibres, and the Emiſſion, Refraction,

" Reflexion,

" Reflexion, and other Phænomena of Light; " as alſo Senſation, muſcular Motion, *&c.* In " Fine, this ſame Matter ſeems the *Primum Mobile*, the firſt Source or Spring of phyſical " Action in the modern Syſtem." *Chambers's Dictionary.*

At the End of the *Principia*, Sir *Iſaac Newton* ſpeaks of a moſt ſubtil Matter, which, he ſays, " pervades, and lies hid in all groſs Bodies; by " the Force and Action of which Spirit, the Particles of Bodies mutually attract one another at " ſmall Diſtances, and cohere when in Contact; " and electric Bodies operate at greater Diſtances, " as well by repelling as attracting the neighbouring Corpuſcles; and Light is emitted, reflected, " refracted, inflected, and heats Bodies, and all " Senſation is excited, and the Members of animal Bodies move, at the Command of the Will, " namely, by the Vibrations of this Spirit, mutually propagated along the ſolid Filaments of " the Nerves, from the outward Organs of Senſe " to the Brain, and from the Brain into the Muſcles: But, ſays he, theſe are Things that can't " be explain'd in few Words; nor are we furniſh'd with that Sufficiency of Experiments, " which is requir'd to an accurate Determination " and Demonſtration of the Laws, by which this " electric and elaſtic Spirit operates." Thus accounting for that otherwiſe unaccountable Phænomenon, animal Motion.

Quæry. Whether we may not moſt reaſonably conclude,

The elementary Fire of the Ancients,

The *Materia ſubtilis* of *Des Cartes*,

The Æther, or elaſtic ſubtil Medium of Sir *Iſaac Newton*, and

The remarkable Phænomenon, electrical Fire juſt diſcover'd *, to be one and the ſame ſubtil Subſtance:—Particularly, as we can obſerve ſuch a remarkable Agreement, Similarity, and Coincidence among the ſeveral ſuppos'd ſubtil Mediums.

That it ſhould be reaſonable to ſuppoſe electrical Fire to be that very identical ſubtil Subſtance, or Medium, can't well be doubted, ſince all the moſt eſſential Properties which they aſcrib'd to their elementary Fire, Æther, or expanſive ſubtil Fluid or Medium, are found in electrical Æther, and that alſo in the utmoſt Degree of Perfection.

B. How do you prove the electrical Matter to be endu'd with thoſe eſſential Properties?

A. By the moſt convincing Experiments: But I ſhall not dwell on a long Series of Experiments, for if the inviſible, expanſive, ſubtil Medium, which has been ſo long ſuppos'd, and ſo clearly explain'd by Sir *Iſaac Newton*, is, or is not, that very identical Subſtance, which is now render'd viſible, and realiz'd to the other Senſes, and of which we have ſuch effectual Means put into our Hands to examine it by, inſomuch that we can't eaſily miſtake its Nature and Properties; a few capital Experiments muſt neceſſarily be abundantly ſufficient to determine it: For, if we can produce one ſuch powerful, elaſtic Æther, or ſubtil Medium in Nature, as he has deſcrib'd, and endu'd with ſuch other ſurpriſing Properties as he has aſcrib'd to his Æther, it is preſum'd there can't be left much Room for Doubt or Heſitation; becauſe none will expect to find, at the ſame Time, two ſuch univerſal, expanſive, attracting, repelling, inconceivably ſwift, and powerful, ſubtil, fluid Mediums in Nature, form'd ſo exactly alike, as that one can't be diſtinguiſh'd from the other. Again,

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* The complete Diſcovery of Electricity is ſuppos'd to take Date at the Diſcovery of the Shock.

None will expect to find unerring frugal Nature grown all at once profuſe, as it muſt undeniably be, and that too in the moſt ſuperlative Degree, if this could be prov'd; and, every one would allow, ought juſtly to be chronicled, as the firſt Time it was ever known to be ſo.

B. But how will the greateſt Objection, brought againſt thoſe kind of Arguments to prove a ſubtil Medium, be remov'd; namely, ſuch as this: Can it be thought probable, not to ſay poſſible, that the moſt ſtupendious and moſt powerful mechanical Agent in Nature, as the ſubtil Medium of Philoſophers is allow'd to be by the very greateſt of them, even capable of being the firſt and only inſtrumental Cauſe of the greateſt Operations we behold in it; I ſay, can it be ſuppos'd reaſonable, that ſo mighty an Agent ſhould be ſo clearly diſcover'd, by ſo ſimple a Method as the electrical Machine?

A. But, ſince we are capable of diſcovering ſuch a powerful ſubtil Medium by that ſimple Method, what Reaſon have we for quarrelling with the Method; for, as all Things are alike eaſy to the great Revealer of Secrets, have we Reaſon to be out of Humour, merely becauſe his Method of diſcovering it to us is eaſy and plain?

Can ſuch Objections be really juſt? Are they not indeed moſt ridiculous? What can be ſaid for Men, when we find them thus quarrelling with the only Method that was ever found capable of diſcovering any ſuch powerful ſubtil Medium? For,

Was it ever clearly prov'd before? Was not all that was affirm'd by thoſe Philoſophers, concerning it, mere Conjecture?

Whereas, by Means of electrical Experiments, we are as ſure that ſuch a Medium really exiſts, as we are of any one Thing of which the Senſes can inform us—nor can the Expoſing ſuch a Method of Reaſoning be derogatory or injurious to the illuſtrious Characters of thoſe eminent Philoſophers, who, we are ſure, were far from being miſtaken, in the Thing itſelf, by our finding them ſo conſtantly deſcribing it, with all the great and eſſential Qualities which we actually behold in it, now it is ſo plainly diſcover'd; but the very greateſt of them, even the great Sir *Iſaac Newton* himſelf, never pretended to prove the Certainty of its Exiſtence otherwiſe than by its Effects.

And, notwithſtanding his ardent Deſire to find it out, and his many ſagacious Experiments to prove it, yet none could be thought of, or invented, that were ſuffieient to make a clear Diſcovery: One of thoſe inquiſitive Experiments we find in his Optics, *Quær.* the 18th—and, although he infers very largely from the Premiſſes, yet is he far from giving his Opinion, whether it was an inviſible Fire, or not, but frankly owns he does not know what it is, *Quær.* 21.

How the ancient Sages were furniſh'd with Hints ſufficient to diſcover it to be an inviſible, pure Fire, is not eaſily to be conceiv'd, notwithſtanding they deſcrib'd it ſo very exactly.

B. How is the electrical Fire immediately produc'd?

A. Out of the Earth and Air, but particularly the former.

EXPERIMENT I.

Tending to point out the Source, or main Spring, from whence it is deriv'd.

IF a Perſon, ſtanding on the Floor, lays his Hand on the glaſs Globe in Motion, the electrical Matter is produc'd in great Plenty, as we find by its Acting ſo vigorouſly on the Gun-barrel, or other Apparatus of Wires; but if he ſteps on a Cake of Reſin, *&c.* it is very much weaken'd, and very little Fire or Attraction is to be found on the ſame, notwithſtanding the Friction be continu'd at the glaſs Globe *: To prove that this is no Deception, let him put a Foot again to the Floor, and they will that Inſtant act vigorouſly as before, and be again as inſtantly depriv'd of that Power at Lifting it up again, and *vice verſa.*

B. But if this ſubtil Agent can be ſo plainly prov'd to be produc'd from the Earth, it would be but natural to find in it as perpetual a Tendency to eſcape into it again; which if you can alſo prove, it will be a farther Confirmation of your Aſſertion and Experiment.

A. Nothing can be much eaſier prov'd; for which Reaſon, and to ſhew likewiſe, that a few capital Experiments will, as above, be ſufficient for my Purpoſe, I ſhall produce a ſingle one, which alone proves the electric Matter to be endu'd with a moſt ſurpriſing Subtilty and an inconceivable Velocity; and which alſo proves or greatly illuſtrates the Doctrine of Sir *Iſaac Newton, viz.* that this ſubtil Medium is contain'd in all denſe Bodies: Alſo, that in denſe non-electrical Bodies it will, upon the firſt Impulſe of the electrical Matter, ruſh out and give Place to it, to occupy the ſame Space, and may be reaſonably preſum'd to execute the ſame Office.

Alſo, that the Air, particularly a dry Air, appears to be one of the greateſt of Electrics *per ſe*, and the Body of the Earth, the moſt complete Non-electric.

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* The ſmall remaining Part on the Apparatus is ſuppoſed to be ſupplied by the Air.

EXPERIMENT II.

Electricity unveil'd, or an Experiment tending to prove what it really is; alſo its great Inclination to return into the Earth from whence it came.

IF Wires are ſupported with ſilken Strings to any given Length whatſoever, and then electris'd; although they will ſhew as great an Energy, and produce as ſmart a Crack, or Exploſion, at the greateſt Extremity as near the Machine, particularly if the Air and ſilk Supporters are very dry, yet, if they are touch'd but with a Finger of a Perſon ſtanding on the Floor, at the ſame, or any other Diſtance, the whole Length of the Wire will be, that Moment, depriv'd of its electrical Virtue, and not the leaſt Sign of Fire or Attraction will be found at any Part of the Apparatus, and will be again as inſtantaneouſly reſtor'd to its former Activity by taking off the Finger.

What Experiment can poſſibly prove any Thing more effectually than this does that of extreme Subtilty and inconceivable Velocity?

For although when a Finger is on, even at the farther End, no Fire or Attraction is to be found throughout the Whole, yet it muſt, at the ſame Time, be undeniably paſſing through the internal Parts of the Wires, and through the Perſon into the Earth, otherwiſe it could not again ſo inſtantaneouſly accumulate and form an Atmoſphere on them, at Removing the Finger: Or if, inſtead of removing the Finger, he ſteps upon a Cake of Reſin or Bees-wax, the Effect will be the ſame; and again, if he but touch the Floor with one of the Toes of his Shoes, while ſtanding on the Reſin, and a Finger on the Wire, the Whole will again, that very Inſtant, be depriv'd of its Activity, and ſo continue as long as he either keeps his Foot on the Floor, or if but touch a Perſon with a Finger of the Hand at Liberty.

QUÆRIES.

DOES not the Air, in this Experiment, act the Part of an Electric *per ſe*, and that in a moſt remarkable Manner? Were it not ſo, in all Probability, there never could have been the leaſt Appearance of what is call'd Electricity; it muſt neceſſarily vaniſh into it again, as ſoon as excited, notwithſtanding the contiguous Wires and ſilk Supporters; but, inſtead of that, does it not cling and accumulate on the Wire, as we find by its Attracting light Bodies; forming an Atmoſphere to a conſiderable Diſtance from the envelop'd non-electric Body, rather than depart again into the heterogeneous Maſs, from whence * Part of it ſeems juſt collected; and will it not, as it were, ſuffer itſelf to be taken Captive in the Condenſing-phial, rather than return thither again?

And does it not ſeem to have as great a Propenſity to eſcape into the Body of the Earth, as a Reluctance towards Returning into the Air? Does it not, at the Touch of a Finger, &c. though at the greateſt Diſtance, dart, that Moment, into the Earth, through the Perſon and all the intermediate Wires; or if, by this or any other Means, theſe Wires are brought in Contact with any Non-electric which has a Communication with the

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* Although the principal Part of the electrical Æther is ſo undeniably attracted from the denſe Non-electrics near the Glaſs, and ſupply'd from the Earth; yet, in all Probability, a ſmall Portion likewiſe is rubb'd or ground out of the Air, as no ſmall Quantity of Air muſt neceſſarily paſs between the Hand and revolving Globe.

Earth, the Effect is always the ſame, and not the leaſt Sign of Fire or Attraction is to be found on any Part of the Apparatus.

Does not the original Æther, in this Experiment, quit the internal Parts of the Wires, and give Place to the newly collected Æther or electrical Fire, to enter and occupy the ſame Space; and, conſequently, execute the ſame Office, which it muſt neceſſarily do, all the Time the Wire has this ſuppos'd Communication with the Earth, and the Machine in Motion; and does it not, as it were, leap into the Earth through the Perſon and the internal Parts of the Wires ſo inſtantaneouſly as not to allow Time ſufficient to accumulate or form any Manner of Atmoſphere on the external Parts? For, if the ſmalleſt Degree of Accumulation were on the external Parts, ſome ſmall Degree of Attraction would be alſo found, which yet is not the Caſe.

Does not the electrical Fire as effectually paſs from the Machine, through the internal Part of the Wire, and through the Perſon into the Earth, as ſurely as Water is convey'd through a Pipe, all the Time the Machine is in Motion, and the Perſon with his Finger on the Wire; and is not this Communication with the Earth as effectually ſeparated by his Stepping on the electrical Cake, ſince the whole Line that Moment acts vigorouſly? What much adds to the marvellous Part, is, that the Wires being touch'd, though at the greateſt Diſtance, ſhould ſo affect it, as to put an entire Stop to the Appearance of either Fire or Attraction throughout the whole Length of the Line, as effectually as if done ever ſo near the Machine.

Upon the Whole, if this Experiment alone is not allow'd to be concluſive, I ſhould be very glad to be inform'd of the Reaſon why; particularly if we are to ſuppoſe, with Sir *Iſaac Newton*, that the

Pores of the Wire were replete with the Particles of Æther, before the Machine was in Motion: If the electrical Fire were not actually the ſame Subſtance with the Æther, why would the original Æther in the Wire be found ſo naturally to ruſh out firſt into the Earth, and give Place to the electrical Æther to follow it? For it is imagin'd it will not be reply'd, there was Room enough in the Wire for both, or for the electrical Fire to paſs by the Side of the original Æther, contain'd in the internal Parts of the Wire.

N. B. I have inſiſted the more on this Experiment, becauſe, though it is moſt eaſily perform'd, yet no Experiment can well be more clear and concluſive, or prove any Thing more effectually than this does, that they are one and the ſame.

B. But although the original Æther in Animals, Metals, *&c.* appears ſo naturally to move out at the firſt Impulſe of the electrical Æther, and reſign its Place and Office at once; yet, ſurely, it can be no abſolute Proof that they are the very ſame Subſtance; becauſe we know Water will drive Air out of a Caſk, Tube, or Pipe, and then poſſeſs the ſame Space; yet, no-body will affirm that Water and Air muſt for this Reaſon be the ſame Subſtance.

A. This would appear like a formidable Objection indeed, if Water was ſo much like Air, that one could not be diſtinguiſh'd from the other, and endu'd with the moſt eſſential Properties aſcrib'd to Air; but, if not, it can be but of little Weight, nor can any Arguments to prove the Contrary be admitted, but ſuch as are equally ſtrong, and ſupported with Experiments equally clear and concluſive; this being what is expected in all other Caſes, it will be thought but reaſonable, that the preſent Caſe ſhould reſt where the preſent Arguments and

Experiments leave it, till ſuch equal Arguments and Experiments are produc'd againſt it.

B. But how can it be known that this ſubtil Subſtance is paſſing, as you ſay, through the *internal* Parts of the Wire, in the above Experiment, all the Time the Perſon on the Floor keeps his Finger on the Wire? Why may it not be more reaſonably ſuppos'd to paſs along the Surface?

A. Not only becauſe there is no Fire or Attraction to be found throughout the Surface of the whole electrify'd Line, but many other Experiments ſo clearly prove it to paſs through the internal Parts of Bodies, as to put it beyond Diſpute, ſuch as the Experiment of the capillary Syphon, and many others.

In the Experiment of the capillary Syphon, for Example, it muſt neceſſarily pervade the whole Body of the Water, before it can come to the lower End of the Syphon at the Bottom of a glaſs Cup: I have alſo prov'd it, through a glaſs Veſſel of Water, twenty-ſeven Inches in Length: Alſo by bringing a Chain from the condenſing Phial to the Cock of an upright Barrel of Liquor, then putting a Finger to the Liquor at the Bung, in the Top, and bringing a Finger of the other Hand to the excited Apparatus; the electrical Æther was obſerv'd to paſs through it moſt freely, becauſe a ſmart Shock was felt as uſual in the Elbows.

In the preceding ſecond Experiment appears ſomething moſt wonderful.

The ætherial Spirit, or ſubtil Medium, is not only undeniably found to poſſeſs and fill up the Pores of the denſe Wire, where it is conſequently exceeding fine and rare; but it appears alſo quite looſe and free, and ſo active as to quit its Place at the very firſt Impulſe of the electrical Æther at the Machine, notwithſtanding the Machine be at ever ſo great a Diſtance from the Part where the Wire communicates with the Earth; and though the metallic Tube, for ſo I can't help calling the Wire, with Regard to the moving Æther, be ever ſo often turned and returned, and ever ſo many Angles form'd *.

Let us then once more, for the Sake of Illuſtration, ſuppoſe a Wire, of ſome thouſand Miles in Length, ſupported as above with ſilken Strings; from any Thing that appears to the Contrary, we can have no Reaſon to believe but that the Effect would be, to Senſe at leaſt, equally the ſame as if it were no more than ſo many Inches or Barleycorns in Length.

Or, inſtead of ſuch a Length of Wire, let a Number of Men continu'd to the ſame Length be ſuppos'd ſtanding on Cakes of Reſin, all joining Hands, or communicating with each other by Means of metallic Bodies, yet ſtill the Effect muſt be the ſame; and if the Perſon, at the utmoſt Extremity, were but to put his iron Rod to the Earth, or put a Foot on it, the whole Length will that Moment be (as prov'd above) depriv'd of its Fire and Attraction, even quite to the very Machine itſelf; and the former Activity as inſtantaneouſly reſtor'd throughout the Whole, at Lifting up of the Foot or iron Rod, particularly if the Air be ſuppos'd perfectly dry.

B. How is it poſſible to account for ſuch an amazing Paradox?

A. No otherwiſe than by conceiving its Motion to be perform'd in the ſame Manner as the ſolar Rays, ignited Æther, or Light; which by Means of an aſtoniſhing Elaſticity, their Motion is propagated or reflected to the Diſtance of ten Millions of Miles in a Minute; *viz.* by conceiving each elaſtic Particle to drive the next Particle forwards in the very ſame Manner as Solids do.

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* This is ſuch a Property belonging to electrical Æther, which, before it was diſcover'd by electrical Experiments, was ſcarce ever imagin'd to belong to any Kind of ſubtil Fluid in Nature.

And, notwithſtanding the Velocity of Light is ſo great, yet is there no leſs Reaſon to conclude, from the Experiment, but that the Motion of the electrical Æther is equally inſtantaneous, from the electrical revolving Globe, into the Earth.

N. B. It is to be obſerv'd, that by the two foregoing Experiments a Circulation is perform'd, although we ſeem quite ignorant of it, as well as many other Kind of Circulations in Nature, of which thoſe Experiments furniſh us with various Hints.

By the firſt Experiment we plainly perceive it to be ſupply'd from the Earth, through the Inſtrument of Friction to the prime electrical revolving Globe, where the violent Force of Attraction is form'd: And by the ſecond Experiment we as plainly perceive it to return from the Globe to the Wires, and through the Perſon into the Earth again.

So that if a Perſon, with a Hand on the Globe in Motion, touch any Part of the excited Apparatus with his other Hand, a Circulation of the electrical Æther is perform'd through him at the ſame Time; *viz.* attracted by the glaſs Globe from his Hand and Body, and ſupply'd by the Earth; and back from the Apparatus, through the other Hand into the Earth again.

B. Sir *Iſaac Newton* frequently makes Mention of a violent rapid vibrating Motion in his Æther, which communicates Motion to other Bodies.

So that, by its Pulſes or Vibrations, he accounts for many of the Operations of Nature.

And even that of Senſation is ſaid to be perform'd by the Vibrations of this ſubtil Spirit propagated along the ſolid Filaments of the Nerves, begun by external Objects, and convey'd to the Brain.

The different Sorts of Rays of Light alſo he conceives to make Vibrations of different Bigneſſes; which, according to their different Size, excite Senſations of different Colours; much after the ſame Manner as Vibrations of the Air, according to their different Bigneſs, excite Senſations of ſeveral Sounds*.

I ſhould be glad therefore to know if you have any Experiment which proves ſuch a vibratory Motion in electrical Æther?

A. There is one in particular that appears very much to illuſtrate ſuch a Suppoſition, which Experiment ſeems to be perform'd by Means likewiſe of a violent elaſtic Force †, inherent in the electrical Æther, and is as follows:

EXPERIMENT III.

IF a downy Feather, or a Piece of Thiſtle-down, be laid near the Edge of a ſmooth Plate of Metal, and brought to the Diſtance of two Inches, more or leſs, of the excited Gun-barrel or Wires, *&c.* which proper Diſtance by Trials is ſoon found, laying a Finger, at the ſame Time, on the excited Apparatus, till it be brought to a proper Diſtance; the Feather will, at Taking off the Finger, be attracted and repell'd with ſuch an aſtoniſhing Celerity, that we even loſe Sight of it, both as to its Form and Motion; and all that will be diſcern'd, is its Colour only ‡, which fills up the whole Space in which it vibrates; for which Reaſon it is impoſſible to form any tolerable Conjecture or Computation of the Number of Vibrations perform'd, which poſſibly may be ſome Thouſands in the Space of a Minute, ſo inconceivably ſwift is its Motion: If the Piece of Metal be held ever ſo little farther off, the Motion will be much retarded; but if it be brought nearer, or to about an Inch and an Half of the electris'd Body, it makes a full Stop all at once; it then communicating the Fire as faſt to the Non-electris'd, as it receives it from the electris'd Metal; but the proper Diſtance is ſometimes greater, ſometimes leſs, according to the Size of the Thiſtle-down *.

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* *Chambers*'s Dictionary.

† Sir *Iſaac Newton*, when ſpeaking of Æther, ſays: That the elaſtic Force of this Medium is exceeding great, may be gather'd from the Swiftneſs of its Vibrations. *Opt. Quær.* 21.

‡ This is not to be ſeen in Perfection, except the Machine acts vigorouſly.

B. What do you infer from this vibrating Motion, as you call it, of the Feather which is thus mov'd backward and forward like a Shuttle-cock, by the attracting and repelling Quality of the electrical Matter? Can this Motion of the Feather ſhew a vibrating Property in the electrical Matter? This ſeems to prove no more than what is generally allow'd, namely, that, where Attraction ends, Repulſion begins.

A. But the Reaſon, why an equal Repulſion ſhould begin where Attraction ends, does not appear quite plain: We are told that a Body which receives an Impreſſion, but does not retain it, is call'd an elaſtic Body, and,

If the Force of Reſtitution be equal to the Force of Compreſſion, it is ſaid to be perfectly elaſtic.

Here ſeems indeed to be a Reaſon pointed out, why it may be expected, that, where the repulſive Power ends, there an attractive Power, or a Power in the oppoſite Direction, ſhould begin; namely, the different and alternate Motions of an active elaſtic Agent; or, to ſpeak more intelligibly, where the Force of Pulſion or Compreſſion ends, there the Force of Reſtitution, or what is otherwiſe often call'd Attraction, begins; and electrical Experiments furniſh us with various Hints, which ſeem to countenance an Hypotheſis, even of a perfect elaſtic Quality in Æther: Sir *Iſaac Newton* himſelf ſuppoſes it to be 700,000 Times more elaſtic than Air, and 700,000 more rare, in his *Optics*, *Quæries* 21 and 22 *.

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* In this Experiment the Feather is oftentimes obſerv'd to move circularly when brought to a little farther Diſtance, *viz.* where the Motion is more ſlow.

Quæry I. If the Suppoſition of ſuch a perfect Elaſticity in the ætherial Medium be not agreeable to the conſtant vibrating Motion which it is ſuppos'd to be endu'd with?

On the Suppoſition of ſuch a univerſal vibratory Motion throughout Nature, and of complete Elaſticity in the Parts of the univerſal Æther.

Quæry II. Whether it is not arguing conſiſtently to ſay (inſtead of ſaying, where Attraction ends, there a repulſive Force begins) where Repulſion or Compreſſion ends, there an equal Power of Elaſticity or Reſtitution muſt conſequently begin? Since, by ſuch a Suppoſition, a univerſal mechanical Motion, when once begun, muſt be perpetuated? All which appears, likewiſe, not only agreeable to the above ſuppos'd conſtant Vibration of the Parts of Æther, but ſimple, and therefore ſo much the more like Nature; agreeable alſo to the Opinion of the renown'd *Boerhaave*, *viz.* that Fire is the Cauſe of all the Motion in the Univerſe.

B. Which is the chief or moſt prevailing Property in electrical Æther?

A. The Properties are ſo numerous, and withal ſo remarkably great, it is ſomething difficult to determine which is the Chief; but, when it is arreſted and detain'd in the Phial, the moſt prevailing Quality appears to be a Tendency to circulate, which is always remarkably conſpicuous, whenever a Shock, as it is call'd, is produc'd, which Circulation is obſerv'd to be perform'd from the charg'd Condenſing-phial to the ſame Place again; and, whatever be the Form of the Circuit, the Reſult will ſtill be the ſame, nor can any Shock be given, except a Circuit of ſome Form or other be contriv'd, from the Body of the Phial to the Leading-wire; *viz.* the Wire which enters into the Phial, or elſe to ſome Non-electric in Contact with it, as the Gun-barrel, *&c.* on which it is generally ſuſpended.

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* Sir *Iſaac Newton* ſays, the elaſtic Force of the Æther muſt be more than 490,000,000,000 Times greater, in Proportion to its Denſity, than the elaſtic Force of the Air is, in Proportion to its Denſity. *Optics*, *Quær.* 21.

But it is by no Means neceſſary that the Phial be ſuſpended on any Part of the Apparatus, for a Shock may as eaſily, and many Times much more commodiouſly, be given by holding it in the Hand.

EXPERIMENT IV.

In which appears the moſt remarkable, elaſtic, or violent expanſive Force that can poſſibly be conceiv'd, and which may not improperly be term'd the circulating Experiment.

IN Order to explain this Phænomenon the more clearly, I ſhall firſt take Notice of the ſhorteſt Circuit of all, which may be perform'd thus:

Lay the hooked Leading-wire, piercing the Cork of the Condenſing-phial, either to the glaſs Globe in Motion, or elſe to the excited Gun-barrel or Wires, by which Means it will ſoon be ſufficiently charg'd; which done, put one End of any metallic Body to the Coating of the Phial, and then bring the other End to the Wire which conveys the Fire into it, through the Cork, where it will burſt and produce a ſmart Crack or Exploſion, but the Perſon who makes the Experiment will receive no Shock; the Reaſon of which is, the conſtant Rule it obſerves, in always paſſing the neareſt and ſhorteſt Way poſſible, which in this Experiment is through the connecting Wire, or that which comes from the leaden Caſe of the Phial, to the Wire paſſing through the Cork.

In this ſhorteſt Circuit, the moſt Fire and the greateſt Exploſion is produc'd *; and thoſe Effects are, as may reaſonably be ſuppos'd, according to the Size of the glaſs Veſſel prepar'd for its Reception.

B. How can you be ſure that any Circulation is perform'd in this Experiment, by only ſeeing it burſt at the Meeting of the two Wires?

A. To prove that there will always be a Circuit form'd in this Experiment, and that from the Part where it is generated to the ſame Part again, *viz.* from the Inſide of the Phial to the Inſide of the ſame Phial again: Let the Circuit be enlarg'd, thus:

Inſtead of bringing the connecting Wire from the Coating of the Phial to the Wire leading into it, as in the laſt Experiment; let a Perſon graſp the charg'd Phial, and bring a Finger of his other Hand to the Wire which leads through the Cork, at which Place it will crack or explode as before; but, in this Experiment, the Perſon receives a Shock, particularly at his Elbows or Wriſts; for, as the greateſt Part of this Circuit was form'd by the Perſon, the neareſt Way it could circulate muſt be through his Arms and Breaſt, which being perform'd with the utmoſt Violence, is the Reaſon why thoſe Parts are ſo affected, particularly the Elbows or Wriſts, where it meets with the greateſt Reſiſtance.

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* The Exploſion is very ſmall when the Circuit is large, proved by Mr. *Watſon*'s Experiments. See his *Treatiſe on large Circuits*, Page 54.

Again, to increaſe the Circuit, let two, three, or more Perſons, all join Hands, and the Perſon at one Extremity either touch the Coat of the Condenſing-phial, or elſe hold it in the Hand at Liberty; then let the Perſon at the other Extremity bring his Hand to the aforeſaid Wire which leads into the Bottle, and they will all at the ſame Inſtant receive an equal Shock; and this, as is well known, will equally ſucceed, let the Number of Men be ever ſo great, and the Circuit ever ſo much enlarg'd.

This Experiment may be otherwiſe vary'd.

Let the aforeſaid Number of Men, or, if you pleaſe, a whole Army, form themſelves into a Circle, or a Circuit in any other Form, all joining Hands, excepting two only; one of which taking the prepar'd Phial into the Hand at Liberty, holding it by the coated Part; then let the Perſon at the other Extremity touch the conveying Wire which leads thro' the Cork, and the Circulation will be inſtantly compleated throughout the whole Army, and every Individual will that Moment receive the Shock.

B. Is it not reaſonable to ſuſpect ſome great Deception in this Experiment; for how can it be ſuppos'd credible, that the largeſt Circle can be compleated, ſo as to move all round it in the ſame Space of Time as round the ſmalleſt, unleſs it were to move all at once, like a ſolid Wheel on its Axis, which, if the leaſt Part of the Circumference were mov'd forward, the Whole muſt move; or like any ſolid Body of the greateſt Length, which could not be puſh'd forward ever ſo little at one of the Extremities, but every Part muſt be equally affected; but this, it is imagin'd, cou'd never be the Caſe in that Experiment, if it were for no other Reaſon than that it is a Fluid, and moves not in a Circle, but generally in an irregular Circuit?

A. As to its being incapable of moving like a ſolid Wheel, becauſe it is a fluid Body, perhaps can be no juſt Reaſon; for, if it be compleatly elaſtic, the Compleatneſs of its Fluidity may be ſo far from an Impediment, that it may poſſibly very much contribute towards the Motion being equally free, whether its Paſſage be regular or irregular. And, that a Motion may be ſo ſwift as to appear inſtantaneous, we need only conſider the Velocity of the ſolar Rays.

B. It was always much queſtion'd, whether there was any ſuch Thing in Nature as a compleatly elaſtic Body?

A. But this was before the Properties of Æther were ſo well known; we then were acquainted with nothing in Nature, except the Rays of Light, ſo elaſtic, as to propagate a Motion ſo inſtantaneouſly to the greateſt Diſtance, by almoſt the leaſt Impreſſion or Impulſe, and this, though the Wire in which it is contain'd, be ever ſo often turn'd and return'd. It is true, this appears ſo great a Paradox, that, if it were poſſible, we ſhould be ready to diſbelieve our very Senſes; but as Facts are ſo ſtubborn as to yield to no Arguments, however ſubtle or nicely form'd; ſo we are at length forc'd to ſubmit, and it is preſum'd the greateſt Philoſophers will never be able to account for this wonderful Phænomenon, unleſs they aſcribe to Æther ſuch a Property as was imagin'd to belong to no kind of Matter in Nature, namely, that of perfect Elaſticity, or what makes a very near Approach to it; altho', as above, ſuch a perfect Elaſticity in the ſubtil Medium muſt ſeem abſolutely neceſſary to perpetuate that vibratory Motion, which Sir *Iſaac Newton* conceives not only to ſubſiſt in it, but alſo to be the Cauſe of many of the greateſt Operations in Nature.

This Tendency to circulate, and that in the ſhorteſt and neareſt Way poſſible, is ſo remarkably great, that no Length or Breadth even of Waters can prevail with it to diſperſe or ſpread itſelf from the Point of Direction given; it having been prov'd along the Sides of Rivers, and acroſs large Lakes of ſome Miles; ſome of theſe Accounts being firſt communicated from *Paris*, Mr. *Watſon*, and ſeveral other Members of the Royal Society, try'd the ſame Experiment with Succeſs, acroſs the River *Thames*, at the new Bridge, *Weſtminſter* *.

Another Time at *Shooters-Hill*, about eight Miles from *London*, he, with nine more of the Royal Society, made other Experiments, in order to prove whether the electrical Fire would revolve in larger Circuits, and whether the Shocks could be ſenſibly felt at greater as well as leſſer Diſtances; and alſo to aſcertain its Celerity: They were therefore made with the greateſt Circumſpection and Exactneſs; which thoroughly convinc'd them, it was not in their Power to form a Circuit ſo large, but that the Revolution always appear'd as inſtantaneous as Light from the Sun, notwithſtanding one was form'd of four Miles, at which Diſtance they alſo found the Shocks to be exceeding great.

B. In what Manner are we to conceive this ſurpriſing Shock and Circulation to be generated or produc'd?

A. Before any adequate Idea can be formed, it will be neceſſary to conſider,

Firſt, That Univerſality and extreme Subtilty of Æther, which is obſerv'd by Sir *Iſaac Newton*, and many other eminent Philoſophers, to be ſuch, as to fill all Space as well as the minute Pores of all groſs Bodies, and is moſt remarkable in thoſe that are the moſt denſe and compacted; for in theſe only it appears the moſt pure, active, and moſt formidable, agreeable to what we obſerve in the electrical Experiments: Thoſe groſs Bodies, which are leſs denſe and compacted, being obſerv'd to admit of the more groſs and leſs active Particles of the common Air, which are ever found to be a moſt remarkable Obſtacle to the free Action of the pure Æther.

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* From the Condenſing-phial on the South Side of the Water, were Wires convey'd over the Bridge, to the Water on the North Side, which convey'd it back to the Phial again, or to Wires contiguous to it.

Secondly, A general Law, which is obſerv'd to obtain in homogeneous Fluids, not only of an apt and ready Unition, but alſo of the leſſer conſtantly eſcaping or vaniſhing into the greater; as when two Drops of Water, a greater and a leſs, are brought in Contact; they will not only cohere and unite, but the leſſer Drop is always obſerv'd to ruſh or eſcape with Violence, or be attracted, into the greater; and, in two ſuch Drops or Globules of *Mercury*, this Propenſity ſeems much greater, for, the greater the Denſity of the Fluid, the more this Principle is obſerv'd to prevail; and, the more compleat the Fluid, ſtill the greater this Propenſity; this ſubtil Medium then being, in all Probability, a moſt compleat denſe Fluid *, ſuch Propenſity is obſerv'd in a moſt eminent Degree.

Thirdly, The fix'd Æther, contain'd in the Pores of the Glaſs, is obſerv'd to be a moſt firm Bond to the electrical Matter, and conſequently no ſmall Contributor towards producing the Shock, by firſt arreſting and detaining a ſufficient Quantity of it;

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* Sir *Iſaac Newton* tells us, it fills all Space adequately without leaving any Pores, and by Conſequence is much denſer than Quickſilver or Gold. *Optics*, *Quær.* 22.

and we may be well aſſur'd, by many Experiments, that this ſubtil Medium, when convey'd into the Phial, is moſt powerfully attach'd to the fix'd Æther in the Glaſs, where the Attraction alſo appears remarkably active; for, if we darken the Room, when the Machine is in Motion, and the Condenſing-phial ſuſpended on it, we no ſooner lay a Finger on the Phial, or any Piece of Chain or Wire hanging to it, not reaching to the Floor, but the original Æther contain'd in the Pores of the Finger is inſtantly attracted into it with ſuch Violence, as to cauſe a ſmall Flaſh of Light in the Phial *.

That this is caus'd by an additional Supply attracted from the Finger, and again ſupply'd by the Earth, will appear by conſidering, that, when the Phial is ſuſpended on the Gun-barrel, *&c.* it receives not ſufficient Strength to produce a Shock, till a Hand, Finger, or ſome other denſe Non-electric, in Contact with the Floor, be laid on it, or to any Bit of Wire, *&c.* hanging to it: This may be prov'd, by attempting to produce a Shock as ſoon as the Fingers are laid to the Phial, which will not then ſucceed; but, after Continuing it on a ſmall Time, and it has receiv'd a greater Supply from it, the Shock will then ſucceed, and conſequently the Circulation, as above †.

And, farther to prove that the Condenſing-phial does actually attract ſuch a Supply from the Earth, let the Perſon who tries the Experiment ſtep on a Cake of Reſin, which cuts off its Communication with the Earth, and then no Shock will be produc'd, although his Hand be continu'd on the Phial ever ſo long.

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* This is ſcarcely perceptible, except the Phial, inſtead of being furniſh'd with Filings, be lin'd with leaf Gold; but then, if the Room be darken'd, it always appears.

† By this it appears, that the Phial, by hanging on the Machine, is only put into a State of Attraction —— but, when the Hand is laid on it, it does then actually attract a ſufficient Supply from it.

And ſtill, if farther Proof were neceſſary, that the moſt remarkable Attraction is towards the excited original Electric, whether Glaſs, Amber, *&c.* Mr. *Rackſtrow*'s Experiment on his Sulphur Globe puts it beyond Diſpute; in which Experiment, Streams of Fire are ſeen iſſuing out of the Pores of the Fingers, though at three Inches Diſtance, ruſhing on the Globe with ſuch Violence, making ſuch a whizzing Noiſe, and cauſing ſo great a Light, as to be ſufficient to ſtartle the Perſon who tries the Experiment.

B. If Mr. *Rackſtrow*'s Experiment prov'd ever ſo plainly, that the Motion of the electrical Æther was from the Fingers to the revolving Globe, yet that can be no Proof, that the Motion is from the Fingers, or other Non-electric, to the Condenſing-phial; for, although the electrical Æther be accumulated at each, yet, the one being excited by the Attrition of the Hand and Glaſs, and the other not, the Direction of the Motion might be determin'd by ſuch different Cauſes, as to have very different Effects?

A. But as the Accumulation in both Caſes appears ſo plainly to be furniſhed immediately by the Earth, *Experiment* 1*ſt*, *p.* 34 *and p.* 58. it will be natural to expect the Effect to be the ſame at the Phial and at the Globe, after Accumulation, whether it be caus'd by Attrition, or not; and the abſolute Cauſe of the Attraction and firm Adheſion of the electrical Æther to the Phial and Globe appears to be the fix'd Æther in their Pores; and this will always be the Caſe, whether the Globe be of Glaſs, Amber, Sulphur, Sealing-wax, *&c.*

Upon the Whole, the fix'd Æther, contain'd in the Pores of the glaſs Phial, appears to be the firſt and principal Cauſe of all the late great Improvements, conſequently the Cauſe of our beholding it act in ſo formidable a Manner; for, had it not been for the fix'd Æther in the Phial, Profeſſor *Muſchenbroek* had never diſcover'd the Shock; and the looſer Æther uniting with the fix'd Æther in Glaſs, or other original Electrics, will, I am throughly perſuaded, be found a much more powerful Cauſe of the late great Improvements in Electricity than is generally imagin'd, and the only Cauſe we are able to detain it, at any Rate, long enough to make the Experiments.

But the greateſt and chief mechanical Cauſe, why Motion is ſo inſtantaneouſly propagated to diſtant Parts, Philoſophers aſcribe to a perfectly elaſtic Quality of the ſubtil fluid Æther, or at leaſt, I ſay, to what ſeems to make a very near Approach to it; and this muſt undoubtedly be the only Cauſe of the Shock, and why the Motion is ſo inſtantaneouſly communicated from the Condenſing-phial to diſtant Parts.

B. What is the chief Property of a perfectly elaſtic Body?

A. That the Force of Reſtitution be equal to the Force of Compreſſion, as above, at *p.* 48.

According to Dr *Quincy*, in his *Phyſical Dictionary*,

" If two ſuch Bodies ſtrike one againſt another, " there will be, or remain in each, the ſame re- " lative Velocity as before, *i. e.* they will recede " with the ſame Velocity as they met together " with. For the compreſſive Force, or the Mag- " nitude of the Stroke in any given Bodies, ariſes " from the relative Velocity of thoſe Bodies, and " is proportional to it: And Bodies perfectly " elaſtic will reſtore themſelves compleatly to the " Figure they had before the Shock; or, in other " Words, the reſtitutive Force is equal to the

" compreſſive, and therefore muſt be equal to the " Force with which they acceded, and conſe- " quently they muſt, by Elaſticity, recede again " from each other with the ſame Velocity. Hence, " taking equal Times, before and after the Shock, " the Diſtances between the Bodies will be equal: " And therefore the Diſtances of Times, from " the common Center of Gravity, will, in the " ſame Times, be equal. And hence the Laws " of meeting Bodies, perfectly elaſtical, are eaſily " deduc'd." ——— Accordingly he proceeds to a Demonſtration.

B. But, tho' this be allow'd in ſolid and firm Bodies, yet, as the component Parts of a Fluid are ſuppos'd to be ſuch as freely to flow by or over each other, and, the more freely thoſe Particles ſlide by each other, ſo much the more perfect is the Fluid: How can it be reaſonably imagin'd, that ſuch a yielding Subſtance ſhould propagate Motion ſo inſtantaneouſly to diſtant Parts, as we obſerve it to do in thoſe electrical Operations?

A. You muſt take Care not to confound an elaſtic Fluid with other Fluids, for an elaſtic Fluid will, on Examination, be found as different from all other Fluids, as if they were quite contrary Things.

To prove which, I ſhall tranſcribe the ninth Page of the *Univerſal Magazine* for *January* 1755, on Fluidity:

" The Nature and Cauſe of Fluidity has been " variouſly aſſign'd. The *Gaſſendiſts* and ancient " *Corpuſcularians* requir'd only three Conditions as " neceſſary thereto, *viz.* a Smallneſs and Smoothneſs of the Particles of the Body, Vacuities in- " terſpers'd between them, and a ſpherical Figure.

" The *Carteſians*, and, after them, Dr *Hooke*, " Mr *Boyle*, &c. beſides the Circumſtances above- " mention'd, require a various, perpetual, inteſ-

" tine Motion of the Particles of the Body, as that " which principally contributes to Fluidity.

" According to theſe Philoſophers, therefore, " Fluidity conſiſts in this: That the Parts of the " Body, being very fine and ſmall, are ſo diſpos'd, " by Motion or Figure, as that they can eaſily " ſlide over one another's Surfaces all Manner of " Ways; and that they be in conſtant, various, " ſeparate Agitation to and fro; and that they " only touch one another in ſome Parts of their " Surfaces.

" Mr *Boyle*, in his Hiſtory of Fluidity, men- " tions theſe three, as the principal Conditions re- " quir'd to Fluidity.

1. " The Minuteneſs of Parts: As, in Effect, " we find that Fire, by dividing Metals into fine, " ſmall Parts, renders them fluid; and that acid " Menſtruums diſſolve and render them fluid after " the like Manner; and that Fire turns the hard " Body of common Salt almoſt wholly into a Li- " quor, by Diſtillation: Not but that the Figure " of the Particles may have a conſiderable Share " in Fluidity.

" Thus Mercury, whoſe Parts are, doubtleſs, " much groſſer than thoſe of Oil and Water, is " yet more fluid than either of them: And thus " Oil, by the Action of Fire, may be converted " into a conſiſtent Subſtance, like Butter.

2. " Store of Vacuities * interſpers'd between " the Corpuſcles, to give Room for the ſeveral " Particles to move among themſelves.

3. " A Motion and Agitation of the Corpuſ- " cles, either from ſome Principle of Mobility " within themſelves, or from ſome extraneous A-

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* The elaſtic fluid Æther is ſo widely different from a common Fluid, as to have no Vacuities, but fills up all Space adequately, without leaving any Pores. *Optics*, *Quær.* 22.

" gent, penetrating and entering the Pores, mov-
" ing variouſly among them, and communicating
" to them Part of its Motion.

" That this laſt is the Qualification chiefly re-
" quir'd in Fluidity, he argues from divers Ob-
" ſervations and Experiments.

" Thus, a little dry Powder of Alabaſter, or
" Plaiſter of *Paris* finely ſifted, being put in a
" Veſſel over the Fire, it ſoon begins to boil like
" Water, exhibiting all the Motions and Phænomena
" mena of a boiling Liquor: It will tumble va-
" riouſly in great Waves, like that; will bear
" Stirring with a Stick, or Ladle, like that, with-
" out Reſiſting; nay, if ſtrongly ſtirr'd near the
" Side of the Veſſel, its Waves will apparently
" daſh againſt them; yet is it, all the While, a
" dry, parched Powder.

" The like is obſerv'd in Sand: A Diſh of
" which being ſet on a Drum-head briſkly beaten
" by the Sticks, or on the upper Stone of a Mill,
" it in all Reſpects emulates the Properties of a
" fluid Body: A heavy Body, *e. gr.* will imme-
" diately ſink in it to the Bottom, and a light one
" emerge to the Top. Each Grain of Sand has
" a conſtant vibratory and dancing Motion; and,
" if a Hole be made in the Side of the Diſh, the
" Sand will ſpin out like Water.

" That the Parts of Fluids are in continual
" Motion, the *Carteſians* bring divers Conſidera-
" tions to prove: As, 1*ſt*, The Tranſmutation
" of Solids into Fluids, *e. gr.* Ice into Water,
" and *vice verſâ*; the chief Difference between
" the Body, in thoſe two States, conſiſting in this,
" that the Parts, being fixed and at Reſt in the
" one, reſiſt the Touch; whereas, in the other,
" being already in Motion, they give Way up-
" on the ſlighteſt Impulſe. 2*dly*, The Effects of
" Fluids, which commonly proceed from Mo-

" tion: Such are the Inſinuation of Fluids among " the Pores of Bodies; the Softening and Diſ" ſolving of hard Bodies; the Actions of corro" ſive Menſtruums, *&c.* Add, that no Solid can " be brought to a State of Fluidity, without the " Intervention of ſome moving or moveable Bo" dy, as Fire, Air, or Water. Air the ſame " Gentlemen hold to be the firſt Spring of theſe " Cauſes of Fluidity, it being this that gives Mo" tion to Fire and Water, though itſelf receives " its Motion and Action from the Æther, or ſub" til Medium.

" *Boerhaave* pleads ſtrenuouſly for Fire's being " the firſt Mover and Cauſe of all Fluidity in " other Bodies, as Air, Water, *&c.* Without this, " he ſhews, that the Atmoſphere itſelf would fix " into one ſolid Maſs." So much for a common Fluid.

But as we can form no adequate Conception concerning an elaſtic Fluid, but what is both dilatable and compreſſible, which other Fluids are not, or very few, and thoſe in a ſmall Degree; and as common Air is the moſt remarkable elaſtic Fluid, we are well acquainted with; let an elaſtic Fluid, like the Air, be imagin'd to be compos'd of Parts that are both dilatable and compreſſible; then, although in a common Fluid, the Parts are ſuppos'd to ſlide eaſily over each other, we can't help conceiving the elaſtic Fluid to be very foreign, and widely different from any of the abovemention'd Fluids: And if Æther be 700,000 Times more elaſtic than Air, which is Sir *Iſaac Newton*'s Proportion, then Æther muſt endeavour to expand itſelf more than Air in the ſame Proportion.

If then the Diſproportion of the elaſtic Force between Æther and that of common Air be ſo exceeding great, notwithſtanding the Expanſiveneſs of Air has been magnify'd to an extravagant Degree, *viz.* that if it were poſſible to place a cubical Inch of Air, of the ſame Denſity it is of, in its natural State at the Earth's Surface, in a Vacuum, where there was ſufficient Room; that then it would probably expand itſelf, till it had fill'd a Sphere, whoſe Diameter was equal to the Diameter of the Orbit of *Saturn.*

If there be any Probability of Truth in ſuch a Suppoſition, and if all the elaſtic Particles which are capable of filling ſo large a Sphere, are alſo capable of being reduc'd, by the Weight of the Atmoſphere, or by any other Means, into the Space of a cubical Inch; in what a wonderful State of Compreſſion muſt then the elaſtic Particles of Æther be, even in its natural State, if its expanſive Force be 700,000 Times greater than that of Air; or, indeed, if a cubical Inch of Æther itſelf were only ſuppos'd in ſo compreſs'd a State, as to be capable of expanding, ſo as to fill ſo large a Sphere as above; even that muſt be almoſt infinitely more than ſufficient to exceed our very Comprehenſion, for the Number of cubical Miles, contain'd in ſuch a Sphere, is more than 1964 × 1000000 × 1000000 × 1000000 × 1000000, *viz.* more than 1964000000000000000000000000.

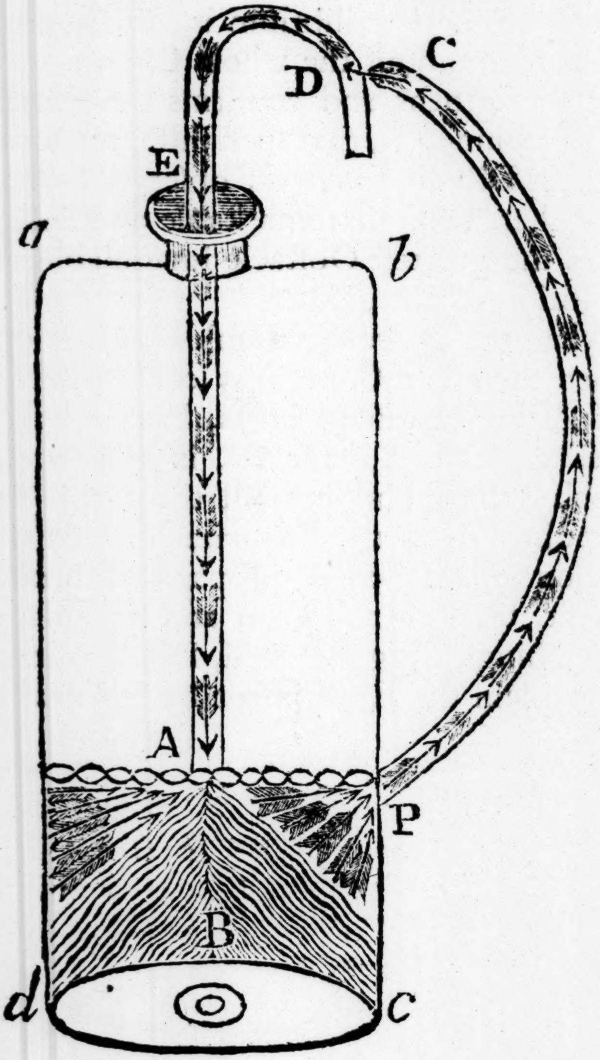
This exceeding great Propenſity to expand itſelf from ſo violent a compreſs'd State, (particularly when ſo much more than is natural is crowded into the Condenſing-phial) is naturally ſuppos'd to be the Reaſon of the ſeveral Parts puſhing each other in all Directions, eſpecially thoſe in that particular Direction which receives the Impreſſion; but more eſpecially in that particular Direction of the Circuit, which is form'd for the ſame Purpoſe, from the Phial to the Phial again; for that appears to be the only Canal for the free Paſſage of the Æther, to the Vacuum form'd at the Phial, by Means of the violent Exploſion; ſo that the Motion

tion to reſtore the Equilibrium is, to Appearance, inſtaneous throughout the whole Circuit.

What ſtrengthens and confirms the above Method of Reaſoning, is, that ſuch inſtantaneous Motion to great Diſtances is never obſerv'd in the open Air; for that, being ſo remarkable an Electric *per ſe*, proves the greateſt Obſtacle imaginable to ſuch a free Motion of the Æther.

But when the above-mention'd Canal is open'd, *viz.* when there is a Continuity of the elaſtic Particles of Æther to diſtant Parts, I mean, when the non-electrical Circuit is form'd, in order to convey the Shock; then, and not till then, the Theory ſeems confirm'd by the Experiment, and we find the Motion inſtantaneouſly propagated throughout the Circuit, be it ever ſo great and irregular.

Theſe Things being premis'd, I ſhall next endeavour to explain the Experiment by Delineation.



Let *a*, *b*, *c*, *d*, be the Condenſing-phial.

PC, joining to the Phial at P, be call'd the Connecting-wire, or Connecting-line.

D E A, leading through the Cork, be call'd the Leading-wire.

A *c* B *d*, the tinſel Fringe, reaching from A, the Bottom of the Leading-wire to the Bottom and Sides of the Phial, that ſo the electrical Matter deſcending

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The fiery Arrows in the Connecting-wire and Leading-wire, &c. are to repreſent the Courſe ſteer'd by the Æther.

ſcending through the Leading-wire may be convey'd to the gold Lining of the Phial.

P. The electrical Fulciment, Fulcrum, or Prop, *viz.* that Part of the original Æther contain'd in the lower End of the Connecting-wire.

Note. That, whereas the electrical Matter and the univerſal Æther ſo plainly appear to be one and the ſame identical Subſtance, it is preſum'd it will be thought a ſufficient Reaſon for my Taking the Liberty of calling the electrical Matter, by Way of Diſtinction, the electrical Æther.

Firſt then: Let the Condenſing-phial be ſuppos'd charg'd with electrical Æther, and held in the Hand; and, if all Things are replete with the univerſal Æther, conſequently the internal Parts of the Connecting-wire C P are replete with the ſame Principle; as alſo of the Leading-wire D E A, which Leading-wire is likewiſe invelop'd in an Atmoſphere, ſurrounding it, to a conſiderable Diſtance, with the electrical Æther; the electrical Æther is alſo conceiv'd to be moſt intimately connected with the original Æther contain'd in the Pores of the gold Lining of the Phial; and alſo to the ſame in the Pores of the leaden Coat of the Phial *, but more eſpecially to the fix'd Æther in the Pores of the Glaſs: Æther, then, ſeems to cohere with Æther ſo firmly, as to cauſe the Condenſing-phial to appear a moſt ſtrong Hold; and all the great and powerful Attraction is for the above Reaſons conceiv'd to be there.

As then the Condenſing-phial, with its Contents when thus charg'd, in Conjunction with the Leading-wire, is obſerv'd to be ſo powerful an Attractor; all other Parts of Æther appear to be attracted towards it, and the Æther contain'd in all other non-electrical Bodies, when brought near enough, is obſerv'd to eſcape, or be attracted into it; therefore the original Æther contain'd at C, in the Connecting-wire or Line, reaching from the Coating of the Phial at P, when brought to D, eſcapes, or is attracted into it.

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* Although the fix'd Æther, in the Subſtance of the Glaſs, does not ſuffer the electrical Æther to fly through it ſo freely as through Non-electrics; yet it is obſerv'd to pervade the Glaſs, ſo as to ſnap againſt the Finger from the leaden Caſe, when ſuſpended to the Gun-barrel.

But, at the Inſtant the Æther is attracted from C into D, the whole remaining Column, quite to the other End at P, of the Connecting-wire or Line C P, inſtantly expands, and is conſequently weaken'd; thus, the Prop P giving Way, the whole Quantity in the Phial burſts from its State of Confinement and follows it; ſo that the End C of the Connecting-wire may be ſuppos'd faintly to reſemble a feeble Water-ſluice, which, by being brought near to D, fails, and the whole Flood conſequently ruſhes forward; in a ſimilar Manner, the Æther in the Wire is conceiv'd to act, and therefore muſt rarify throughout; by which Means P, the feeble Prop, may naturally be expected to fail, particularly as the Compreſſion or Condenſation of the Æther in the Phial was ſo great as to cauſe it to be juſt ready to burſt of its own Accord, which it very frequently does, without joining the Circuit at C D; or, if it will render it more eaſy to be conceiv'd by any who may not clearly apprehend me,

Let the whole Quantity of condens'd Æther in the charged Phial be compar'd to an exceeding ſtrong Spring, which, from the moſt perfect compreſs'd State, inſtantly flies open and drives all before it; eſpecially through the Channel P C, which is form'd for its Paſſage; and thus the Circuit is compleated through the Connecting-wire P C, and through the Leading-wire D E A, to the Part where this inteſtine Eruption was firſt generated; that is to ſay, to *reſtore to an Equilibrium* the hungry Vacuum generated in the Phial, by Means of that violent and ſudden Expanſion made at the Burſting of the Fire in it; which Flaſh of Fire we always behold, if the Inſide of it be lin'd as before-directed, inſtead of being furniſhed with Filings of Metal; ſuch *Reſtoration*, there is the greateſt Reaſon to believe, never fails of being perform'd at the Inſtant the Circuit is compleated; *viz.* at bringing the Point C, either to the Point D, or elſe to any other Part of the excited Apparatus, which has a Communication with the Point D, ſince we never fail of Feeling the Effects of it, particularly if our Arms and Breaſt form any Part of the Circuit.

And this is obſerv'd to be invariably the ſame, whether the Line P C be long or ſhort, crooked or ſtraight; whether it be compos'd of Metals, Animals, Waters, or green Vegetables; or whether it be compos'd of ſome, or all theſe together.

N. B. If what I have ſaid is not ſatisfactory, I wiſh I was capable of conveying my Meaning in a more intelligible Manner.

I have in this Experiment conſider'd the Condenſing-phial, as held in the Hand; though the Effect is equally the ſame, whether it be took off from the Gun-barrel when excited, as was ſuppos'd above, or whether it remains ſuſpended on it.

If the Phial be ſuſpended on the Gun-barrel or Wires, when the Circuit is form'd, it is not material whether it be touch'd at the Leading-wire as before; for (as was obſerv'd above) the End C of the Connecting-line may be brought in Contact with the excited Apparatus of Wires, either near the Phial or at any Diſtance from it, and it ſucceeds equally if it has but a Communication with it.— As to the Shocks, they appear to be entirely owing

ing to the Violence of the Motion, when paſſing through Parts which make the greateſt Reſiſtance.

B. Since you ſay, if the End C of the Connecting-line be caus'd to compleat the Circuit, though it be not near the Phial, but at any other Part of the excited Apparatus, yet the Effect is the ſame; how then do you know whether a Circulation to the Inſide of the Phial again is compleated or not?

A. To prove this, and whether a Shock could be given without forming a Circuit, I made the following Experiment.

Having two Machines in the ſame Room, I put them both in Motion, and endeavour'd to produce a Shock by taking Hold of the Connecting-line from the Phial ſuſpended on one of the Machines, and bringing a Finger of my other Hand to the Leading-wire of the Phial which hung on the other Machine: This had not the leaſt Effect in producing a Shock, but was in all Reſpects the very ſame as if I had had no Communication with the Phial on the other Machine.

That I might not be miſtaken, I repeated the Experiment ſeveral Times.

Quæry. If a Circulation was not perform'd, when a Shock is given, what probable Reaſon can be aſſign'd, why no Shock ſhould be felt in the latter Experiment? For, notwithſtanding, according to the general Law of Fluids, the leſſer ought to eſcape or be attracted into the greater, *viz.* from the Finger to the Leading-wire of the Phial on the ſecond Machine; yet this we find not ſufficient to cauſe it to expand, ſo as to weaken the electrical Prop, at the lower End P of the Connecting-wire of the Phial ſuſpended on the firſt Machine.

Does not the Cauſe ſeem manifeſtly to be for Want of a proper Communication?

At the Breaking forth of the Fire from C to D, in the former Experiment, does not the univerſal or original Æther, contain'd in the whole Connecting-line from C to the Prop at P, appear to move or expand itſelf, all at once, *i. e.* not only at C, but alſo at P, as well as all the intermediate Parts? And, when the Prop gives Way, does not the inviſible Fire in the Phial that Inſtant become viſible, and appear to burſt out from its confin'd State in the Phial, and follow it? And, as ſo violent an Expanſion had caus'd ſo compleat a Vacuum in the Phial, does not the original Æther in the internal Parts of the Leading-wire, hurried on by the Impetuoſity of what iſſu'd from the Connecting-wire, as inſtantaneouſly ſeem to move on to reſtore the Equilibrium? For, without all theſe Requiſites, neither Circulation is perform'd nor Shock felt, as is evident in the latter Experiment.

And, though it is not eaſy to conceive that all this can be perform'd in the ſame Moment of Time, yet the Effect undeniably proves it to be Fact; and that not only in ſhort Circuits, but even when the Connecting-line has been of the greateſt Length that could poſſibly be form'd; and, perhaps, compos'd, as above, of Animals, Metals, and Waters jointly; and though Part of the Earth itſelf has been ſometimes made a Part of the Circuit.

But that neither Shock or Circulation is perform'd without a Communication of the Parts as above, may be farther prov'd, by ſuſpending the Condenſing-phial on the Gun-barrel, graſping it with one Hand, and bringing the other Hand either to the hooked Leading-wire, or to any other Part of the excited Apparatus, and the Shock is produc'd, and conſequently the Circulation perform'd; but, if the Phial be lifted off with the Hand, and the Gun-barrel touch'd with the other Hand, no Shock will be felt; but, touching the

Hook of the Leading-wire, a Shock is receiv'd in both Elbows.

Having had many Thoughts concerning the Manner in which the Circulation and Shock was perform'd, I thought I would try if the Experiment could be ſo inverted, as that, inſtead of producing a Shock by touching the Leading-wire of the Phial, it were touch'd at the Coating of the Phial, when ſuſpended on the Gun-barrel; but as this Experiment could not be made, while ſtanding on the Floor, with the other Hand on the excited Gun-barrel; becauſe, if it be touch'd by any one ſtanding on the Floor, it eſcapes from the Gun-barrel, directly into the Floor, ſo that no Fire or Attraction is to be found (by Experiment the Second); I therefore conſider'd that the Experiment would be the ſame, and anſwer in all Reſpects, if I was electris'd in the common Way, by ſtanding on the Reſin, holding the Condenſing-phial by the Leading-wire, in one Hand, and, in Order to produce the Shock, touched the Coating of it with the other: This, when it was firſt try'd, would by no Means ſucceed, but by Accident a Perſon ſtanding on the Floor took Hold of the Phial; at which Time I touch'd it again, and receiv'd a ſtrong Shock in my Elbows as uſual; but what ſeem'd yet more ſurpriſing, was, that the Experiment would equally ſucceed, though the Hand were taken off again a conſiderable Time before I touch'd it.

This Experiment ſeems to confirm the other at Page 37, by Acting ſo much like it, each one proving that the electrical Æther collected in the Phial was not ſufficient to produce the Shock, till the Phial had attracted an additional Supply from the Finger; and that this was furniſh'd from the Earth is quite clear in both Caſes: In the Former, by finding it not ſtrong enough to produce the

Shock at the firſt Putting on of the Hand, and by the Latter, till touch'd alſo by the Perſon ſtanding on the Floor: And both theſe Experiments, as well as Mr. *Rackſtrow*'s, on his Sulphur-globe, either ſeparately or jointly, illuſtrate and confirm the Truth of the firſt Aſſertion and capital Experiment, Page 19.

In a Word, let this Experiment be diverſify'd and alter'd into ever ſo many different Shapes; yet, ſtill, the greateſt and moſt wonderful Attraction imaginable appears to be not only towards the glaſs Globe in Motion, but towards the Condenſing-phial alſo, in whoſe Pores this powerful Principle ſeems ſo fix'd, and cohering ſo firmly with the electrical Æther.

N. B. The Way and Courſe it ſteers in this Experiment I have taken the more Pains to diſcover, as it may be neceſſary to be known, when treating of bodily Diſorders.

The Knowledge, alſo, of the Courſe which the electrical Æther takes, when convey'd on the Apparatus and touch'd by a Non-electric, may for the ſame Reaſon appear neceſſary to be known.

B. But I am not yet fully ſatisfy'd concerning the Courſe and Direction of the violent Motion; whether from the Connecting-wire to the Leading-wire; or whether from the Leading-wire to the Connecting-wire, that is, whether from the Finger of the Perſon who holds the Connecting-line, and ſo to the Phial; or whether from the Phial into the Finger, and from thence into the Earth; particularly as we find in it ſo ſtrong an Inclination to return thither.

A. Notwithſtanding its great Tendency to return into the Earth, this will by no Means be found equal to that of compleating a Circuit, in which Experiment, that Tendency is ſo remarkable, as even to paſs through a Part of the Earth, and out of it again, in Order to arrive at the Phial where the Motion was generated *, to reſtore the Equilibrium.

Another Reaſon for Believing that the Attraction is from the Finger or Connecting-line towards the Leading-wire, is, that, when the electrical Æther is convey'd to the human Maladies, with ſuch a Suppoſition of its Motion, no bad Accident has ever been obſerv'd to happen, but of this farther on.

N. B. This laſt Reaſon I mention, on no other Account than becauſe ſome who are no Friends to the Method of electrical Treatment of bodily Diſorders, have endeavour'd to perſuade the World, that the morbific Matter, which, before, was only lodg'd at a ſuperficial Part, was by thoſe electrical Operations forc'd inwardly on the more noble Parts; which muſt be very unlikely, if the Motion of the electrical Æther be outwardly.

Another Experiment, which points out the exceeding Elaſticity of the electrical Æther, is the following:

When the Operation is perform'd of ſimply electriſing a Perſon on the Reſin, and drawing off Sparks at the ſame Time with a large Wire or ſmall iron Rod: At the Inſtant the Perſon is touch'd, it is not only felt like a Pulſe under the Finger, when laid on any other Part of the Perſon ſo electris'd; but if ſeveral Perſons ſtand in a Row, or in any irregular Form; and the firſt lay a Finger on the Face or the Back of the Hand of the Second, the Second lay a Finger on the Face or Back of the Hand of the Third, the Third in like Manner on the Fourth, *&c.* when the Firſt brings the iron Rod in the Hand at Liberty to the Fleſh of the Perſon electris'd on the Reſin; at the Burſting of the Fire from the electris'd Perſon to the iron Rod, every Perſon, at the Part in Contact, feels a Pulſation; this is equally the ſame at any Part of the Body; and when it acts vigorouſly, and the Room is darken'd, the Fire is viſible where the Pulſation is felt, *viz.* at the Motion of the Æther when paſſing through Air out of the Finger of the one into the Hand, *&c.* of the other, particularly when they touch but very lightly; this I have obſerv'd in the Day-time, even when I have been at the Diſtance of two or three Perſons from him who touch'd the electris'd Perſon: So that the Æther plainly diſcovers itſelf to be Fire, by the leaſt Agitation, *viz.* by Paſſing ſwiftly through the ſmalleſt Space of Air, out of one denſe Body into another; this will always be found the Caſe, when its acts ſtrong, and when carefully view'd *. But, as each Perſon ſtood on the Floor, it ſeem'd to loſe a Part of its Virtue by Eſcaping into the Earth; for at the firſt Perſon it was ſtronger than at the Second, and at the Second than at the Third, *&c.* but, if all had ſtood on Cakes of Reſin, except the laſt of all, it would have been equally the ſame throughout the whole Length, though ever ſo great.

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* See Mr *Watſons*'s *Treatiſe on large Circuits*, Page 54.

The Motion of the Æther in this Experiment ſeems widely different from the Motion of the Æther in the foregoing Experiment, for in this the ſame Motion may be obſerv'd to be alike continu'd in all Parts of the Body or Bodies; but in the other, that is, when the Shock is given, it appears to act the moſt vigorouſly in a direct Line, as,

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* The Viſibility of the Fire, in this Experiment, and in all others, ſeems to be occaſion'd by its Paſſing ſo ſwiftly through the Air into the next denſe non-electrical Body, that ſo it may arrive at the Earth, or elſe to the Phial.

(where it is not by the Air, or otherwiſe hinder'd) when paſſing through Waters, *&c.* to or from the Condenſing-phial; for then the violent Motion ſeems to be propagated rather in a Column, from and to the Phial.

N. B. Sometimes, when the Air is moiſt, this laſt mention'd Experiment will not eaſily ſucceed; but as I have two Machines in the ſame Room, one of which is furniſh'd with two Globes, it is very ſeldom but I can procure as much of the Fire as is ſufficient for any Experiment.

B. But how can you be ſo vain as to imagine you have made a plainer Diſcovery, not only of the Source or main Spring from whence the electrical Æther is deriv'd, and where it returns, but alſo of its Motion and the Courſe it ſteers, than any other? Pray what have you done in this more than Mr. *Watſon?* Has not he long ago, by a great Number of Experiments, prov'd that this ſubtil Medium is produc'd out of the Earth, and as plainly ſhewn the different Ways and Manner wherein it may be obſerved to paſs from the Earth to the Machine; which may be ſeen at large in his *Sequel*, at the 47th and ſeveral of the following Experiments? You ſeem, indeed, to differ with him in your Imagining that his Electricity never paſſes out of the Earth directly to the Gun-barrel or Wires, but from the Earth to the prime electrical Globe or Tube only; whereas he hath plainly ſhewn, in various Caſes, that the Motion, or the Courſe it takes, is as directly from the Earth, or Finger, to the Gun-barrel and Wires likewiſe.

A. I hope that ingenious Gentleman will excuſe me for differing with him in Opinion, particularly when I have given my Reaſons for it: As to his Opinion that the Æther is furniſhed from the Earth to the revolving Globe, this is ſo obvious as not to be deny'd; and my firſt Experiment exactly agrees with thoſe he has produc'd to prove it.

But that its Tendency is alſo from the Earth, or other unexcited Non-electric, directly towards the excited Gun-barrel, or Apparatus of Wires, *&c.* muſt ſeem a Contradiction, and is accordingly as plainly contradicted by my ſecond Experiment, which conſtantly and invariably ſhews the Courſe of its Motion to be determin'd from the excited Non-electrics the neareſt Way, thro' the firſt denſe unexcited Non-electric in Contact with it, into the Earth from whence it came, as ſwift as Light; but if no unexcited Non-electric in Contact with the Earth comes near the excited Gun-barrel or Wires, it is then, after it has ſeemingly cling'd as long to them as it can, forcibly driven off, particularly at their Extremities, into the Air; but into which it will never paſs, if it can find any Canal whereby it may eſcape into the Earth; and, that this can be no Deception, we are well aſſur'd by its Invariableneſs: And this Experiment is likewiſe ſo eaſily made as to be in the Power of almoſt any one, who comes near an electrical Machine, to prove it.

As for the ſeveral Experiments you mention, they are far from proving the Contrary; I ſhall therefore atttempt to diſcover wherein the Fallacy lies.

In his *Sequel*, from Experiment forty-fourth or forty-fifth to Experiment fifty-ſecond, he has taken Notice of many remarkable Circumſtances, which were diſcover'd, while the Machine was mounted on original Electrics; moſt of which, indeed, plainly prove the Current of Æther to be determin'd by the mighty Attraction at the glaſs Globe excited by the violent Attrition of the Hand, *&c.* but he thinks they plainly diſcover that the Current of Æther is directly from the Earth to the Gun-barrel or Wires, in theſe and all other Caſes, equally; and tells us at Experiment fifty-ſecond, "If, when the Machine is mounted on original "Electrics, any one, while ſtanding on the Floor "brings a Finger, but eſpecially a pointed iron "Rod, near the Gun-barrel, or even to the iron "Axis of the Wheel, it may be plainly diſcover'd "to iſſue from the Point of the Rod (*viz.* when "the Room is darken'd) in diverging Rays, to-"wards the Gun-barrel, *&c.*"

This he conceives to be a plain Proof that the Tendency is always equally from the Earth to the excited non-electrical Apparatus, as from the Earth to the excited prime electrical glaſs Globe.

But as never any Thing like this will be obſerv'd, except the Machine is plac'd on original Electrics; a little Conſideration will be ſufficient to point out the Deception: For, while the whole Machine is ſupported by original Electrics, the Gun-barrel, or Boſs at the End of it, which at all other Times receives the Æther from the prime electrical glaſs Globe only, is by this Means become the Inſtrument of Friction; or, at leaſt, acts the ſame Part, by ſupplying or furniſhing the Globe with Æther; which Supply is furniſh'd from the Earth, as before, though more indirectly, *viz.* through the Perſon on the Floor, who holds the pointed Rod near the Gun-barrel or iron Axis of the Wheel, *&c.* for as the Perſon with his Hand on the Glaſs, in this Experiment, is alſo ſupported with original Electrics, and for that Reaſon is incapable of furniſhing a Supply as in the common Experiments (for all that he now ſeems capable of, is, by the Attrition of his Hand, to put the Globe into a State of Attraction) the ſaid Supply muſt neceſſarily be furniſh'd from the tinſel Boſs at the End of the Gun-barrel, in Contact with the revolving Globe; the Boſs ſupply'd from the Gun-barrel, the Gun-barrel from the pointed Wire abovemention'd, tion'd, the pointed Wire from the Perſon who holds it, and the Perſon ſupply'd from the Earth: So that in this Experiment, although the Gun-barrel, or rather the Boſs, ſeems to act the Part of the Inſtrument of Friction; yet the Surpluſage appears to be return'd again from the Globe to the Gun-barrel, becauſe it will then act again, he tells us, as in the common Experiments, when the Machine is not thus ſupported with original Electrics.

The next Experiments he produces to prove it *, are the 58th and 59th, where, by the Power of Electricity, a ſilver Leaf is ſuſpended between two Plates, when the Uppermoſt is electrify'd, the other not: " This he obſerves muſt neceſſarily be " effected by two oppoſite Motions, for he ſays no " Body can be ſuſpended in Æquilibrio, but by " the joint Action of two different Directions of " Power: So here the Blaſt of electrical Æther " from the excited Plate blows the ſilver Leaf " towards the unexcited Plate; this laſt, in its Turn, " by the Blaſt of electrical Æther from the Floor " ſetting through it, drives the Silver towards the " Plate electrify'd; and adds, We find from hence " likewiſe, that the Draught of electrical Æther " is always in Proportion to the Quantity thrown " by the Globe over the Gun-barrel; or the E- " quilibrium by which the Silver is ſuſpended, " could not be maintain'd." And ſays,

" Now I conceive that the Space occupied by " the Leaf of Silver, is that, where the Equili- " brium of the electrical Æther is reſtor'd; be- " cauſe, if you take away the under Plate, through " which, from the Floor, the Flux of this Æther " is furniſh'd; or if that Plate be placed on an " original Electric, by which this Flux is likewiſe

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* Here the Machine is ſuppos'd not to be mounted on original Electrics as before.

" prevented, the ſilver Leaf will be blown away." But,

If this were ſo, and whenever an unexcited Non-electric was brought near an excited Non-electric, nothing more was perform'd than the Reſtoring the Equilibrium; how comes it to paſs that, when this unexcited is brought near the excited Body, ſo very little Fire or Attraction is to be found throughout the whole Apparatus of the Gun-barrel and Wires? Particularly as this ſeems always in exact Proportion to the Nearneſs of the excited and non-excited Bodies, inſomuch that, when they are brought in Contact, not the leaſt Fire or Attraction is to be perceiv'd on any Part of the Apparatus. *Quæry.* Does not my ſecond Experiment plainly prove it to be all the Time making its Eſcape into the Earth? But

He takes Notice that it may perhaps be reply'd,

" That the ſuſpended Silver may only ſerve as " a Canal of Communication, which diſcharges " the Electricity from the excited Non-electric to " the unexcited; and that when an originally E-" lectric is placed between the lower Plate, in this " Experiment, and the Floor of the Room; that " then the ſilver Leaf is attracted only, until the " lower Plate is ſaturated with Electricity, and no " longer". Then he adds,

" This is as much as Saying, that this Effect " ariſes from Electricity, without mentioning in " what Manner."

I anſwer, He has ſuppos'd that which appears to be the only true Manner whereby it is effected; therefore, no other ſatisfactory Reply can poſſibly be given.

B. But his 60th Experiment ſeems to prove it ſo undeniably to paſs from the unexcited towards the excited Non-electric Body, that I beg Leave to relate the Whole.

" When the Silver lies ſtill (though the Motion

" of the Globe is continu'd) between the two Plates, " one ſuſpended to the Gun-barrel, and the other " placed upon an electrical Cake; a Perſon ſtanding " upon the Floor needs only bring a ſmall " glaſs Syphon, in a Veſſel of Water, and apply " the long Leg thereof near the Plate plac'd upon " the Wax: For, upon this, the Silver is immediately " ſuſpended; and the Water, which before " only dropp'd, now runs in a full Stream, " and appears luminous. Does not, in this Caſe, " the Current of the Water point out the Direction " of the Current of electrical Æther?"

A. I anſwer, no, for the capillary Syphon in this Experiment acts either Way, juſt as it happens to be, either the excited or unexcited Body; in the ſame Manner as when we fire Spirits of Wine, which, if they are electrify'd, are kindled into a Flame, by bringing an unexcited Non-electric near them; or elſe, when they are not electrify'd, are as effectually kindled by the Finger of an electrify'd Perſon,

Thus, in the Experiment of the Syphon, when unexcited, as in his abovemention'd Experiment the Current was from the unexcited Hand which held it towards the excited Plate; yet, if the Syphon be plac'd on the Gun-barrel, and electrify'd, the Current of the Water will then be found to be towards an unexcited Finger, when brought near it. And

Whereas you ſeem'd inclin'd to believe that my Attempt, in this Eſſay, had not thrown the leaſt Light on Electricity, as I might find by examining Mr. *Watſon*'s *Sequel*; I can't help obſerving that there is not in that Tract, or any other, I ever ſaw, the leaſt Mention made of the Reaſons or Cauſes of two ſuch different Qualities among natural Bodies, namely, thoſe term'd Electrics and Non-electrics; which Cauſe, if I have miſs'd in original Electrics, I ſhall be very glad to find a more rational Account appear.

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* It is far from an abſolute Proof in other Caſes.

As to Non-electricals, the Experiments are ſo very clear, that the Way and Manner whereby the Phænomena are exhibited, cannot eaſily be miſtaken: Again, as for our different Ways of explaining and accounting for the violent Shock given to the Parts of Animal Bodies, I ſhall not preſume to determine concerning them, but ſhall leave them to the judicious Reader to determine, whether his Method or mine appears the moſt plauſible; for which Reaſon, and that they may be the more readily compar'd, I take the Liberty to tranſcribe his Method of explaining it.

Sequel, Experiment 64th. "It remains now, that " I endeavour to lay before you a Solution, why " our Bodies are ſo ſhock'd in the Experiments " with the electrify'd Water, *&c. &c. &c.*

" When the Phial of Water held in one Hand " of a Man is highly electrify'd, and he touches " the Gun-barrel with a Finger of his other; upon " the Exploſion which ariſes herefrom, this Man " inſtantaneouſly parts with as much of the Fire " from his Body, as was accumulated in the Water and Gun-barrel, and he feels the Effects in " both Arms; from the Fire of his Body ruſhing " through one Arm to the Gun-barrel, and from " the other to the Phial."

N. B. Theſe Animadverſions on Mr. *Watſon*'s *Sequel* had never been made, had not ſome of the very ſame Objections been offer'd to my Manuſcript, and the very ſame Eſſay of Mr. *Watſon*'s mention'd in Oppoſition to mine.

I have an ingenious Friend, who is an Operator in Electricity, and who, though he differs with Mr. *Watſon* in his Manner of explaining the Shock, particularly when he affirms that the Fire from the

Body ruſhes through one Arm to the Gun-barrel, and through the other Arm to the Phial; yet, in my humble Opinion, is guilty of an Error equal to the former, though juſt the reverſe, he imagining the Fire to ruſh from the Gun-barrel up one Arm, and from the Phial up the other Arm to the Body, when the Shock is given.

Firſt, If either of theſe Hypotheſes are juſt, how comes it to paſs that the Fire breaks forth in ſuch Abundance in the ſmalleſt Circuits, and in ſuch Miniature in Mr. *Watſon*'s *large Circuits?* And,

Secondly, How was the Fire ſent from the north to the ſouth End of *Weſtminſter-bridge*, in Mr. *Watſon*'s Experiment? And at what Point, on the north Side, did it *begin* to run over to the ſouth Side? Whether juſt in the Middle-way; or whether juſt at the Water-ſide, through the great Waters, and, at the ſame Time, through the ſlender Wires, through both, from North to South?

Thirdly, In Mr. *Watſon*'s large Circuit, at *Shooter*'s-*hill*, which were ſometimes compos'd of Animals, Metals, Waters, and Earth jointly:

Quæry, At what Part of the Circuit, muſt it begin to ruſh both Ways through the Circuit towards the Machine; whether at one of thoſe particular Parts, or whether juſt in the Middle of the Circuit? And,

Laſtly, Why the rapid Motion of the Æther is expected to begin ſo far from the Machine, rather than at the Inſide of the Phial, where ſuch a Vacuum was generated, by Means of that violent and ſudden Expanſion, occaſion'd by the Burſting of the Fire in the Phial?

And, doubtleſs, many like Difficulties muſt preſs equally hard in my worthy Friend's Hypotheſis, which accounts for that violent Motion and Direction of the Fire, juſt the contrary Way.

As there is no Doubt, but both thoſe very ingenious Gentlemen are ſincere, and that their only Aim is to diſcover the Truth; ſo I can by no Means imagine, that either of them will be diſpleas'd at any juſt Objection that can be brought againſt their Hypotheſes; becauſe, if Objections were not allow'd in all Diſputes, and afterwards, in a cool Manner, to conſider the Objections thoroughly, and debate the ſame deliberately; then, farewel to all future Improvement in every Art, and, particularly, in whatever appears any Way myſterious. And,

As to my own Part, I ſolemnly declare, I have no other View in Making any Objection, than to diſcover, if poſſible, the very Truth in this important Subject: And,

Therefore, if I am miſtaken, and conſequently my Hypotheſis wrong, I ſhall be heartily glad to be corrected, by a more rational Scheme.

DIALOGUE III.

B. IS this ætherial Medium neceſſary to the animal Œconomy?

A. Yes, ſo abſolutely neceſſary, that, without it, every Animal would very ſoon expire.

Though God alone is the Author and Preſerver of all Things, and which he continually upholds with his immediate Hand; yet, the only inſtrumental Cauſe of our Being is this ſubtil Spirit, or celeſtial Fire, which in its natural State is doubtleſs too much for us in our preſent Exiſtence; for which Reaſon, the all-wiſe and moſt beneficent Father of Nature has provided, for our Safety, the circumambient Atmoſphere, to temper and bring it down to us in ſuch a Manner as is moſt convenient for us, as well as all other earthly Beings, animate and inanimate.

This Fire, ſo temper'd, fitted, and adapted, is

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the Cauſe of all the neceſſary Circulations in Bodies: The immediate Agent and Inſtrument in all earthly Things.

In a Word, the pure Æther or Fire, contain'd in Air, is the Cauſe of all Motion, animal, and vegetable.

This is the Opinion not only of the Ancients, but of many modern Chymiſts, as well as many other eminent Philoſophers.

The learned Biſhop *Berkely*, in his *Siris*, ſpeaking of Air, reaſons thus:

" That there is ſome latent vivifying Spirit diſ-
" pers'd throughout the Air, common Experience
" ſheweth; inaſmuch as it is neceſſary both to Ve-
" getables and Animals, whether terreſtrial or
" aquatic: Neither Beaſts, Inſects, Birds, nor
" Fiſhes, being able to ſubſiſt without Air, nor
" doth all Air ſuffice; there being ſome Quality
" or Ingredient, of which when Air is depriv'd, it
" becometh unfit to maintain either Life or Flame.
" And this, even though the Air ſhould retain its
" Elaſticity; which, by the Bye, is an Argument
" that Air doth not act only as an Antagoniſt to the
" intercoſtal Muſcles.

" It hath both that, and many other Uſes. It
" gives and preſerves a proper Tone to the Veſſels:
" This elaſtic Fluid promotes all Secretions; its
" Oſcillations keep every Part in Motion; it per-
" vades and actuates the whole animal Syſtem,
" producing great Variety of Effects, and even
" oppoſite in different Parts; cooling at the ſame
" Time and heating, diſtending and contracting,
" coagulating and reſolving, giving and taking,
" ſuſtaining Life and impairing it, preſſing with-
" out and expanding within, abrading ſome
" Parts, at the ſame Time inſinuating others, pro-
" ducing various Vibrations in the Fibres, and
" Ferments in the Fluids; all which muſt needs

" enſue from ſuch a ſubtil, active, heterogeneous, " and elaſtic Fluid." *Siris*, *Section* 143.

That this Fire or Æther is the Cauſe of animal Motion, Sir *Iſaac Newton* ſeems to think, is paſt Diſpute, as well as many other Things, which he affects to put as Quæries. Thus,

" Is not animal Motion perform'd by the Vi- " brations of this Medium, excited in the Brain " by the Power of the Will, and propagated from " thence through the ſolid, pellucid, and uniform " Capillamenta of the Nerves into the Muſcles, " for Contracting and Dilating them? I ſuppoſe, " that the Capillamenta of the Nerves are each of " them ſolid and uniform, that the vibrating Mo- " tion of the ætherial Medium may be propagated " along them, from one End to the other uniform- " ly, and without Interruption: For Obſtructions " in the Nerves create Palſies." *Optics*, *Quæry* 24.

Which, by the Bye, was Spinning it out to a great Length; for, although he had many Times view'd this, his ſubtil Medium, under the Hand, in electrical Experiments; yet might he, not very improperly, be ſaid, never to have ſeen it, becauſe he did not apprehend it to be ſuch; therefore to carry it ſo far, as to imagine it the Cauſe of animal Motion, muſt ſhew an exceeding penetrating Genius; and, though many are now of that Opinion, yet they can't think it Working ſo much in the Dark, becauſe they are now *ſure*, there is ſuch a powerful ſubtil Medium exiſting.

B. Why do you think it has a Power ſufficient, as well as a Tendency to communicate Activity and Motion to Fluids in general?

A. Not only from the foregoing Reaſoning, and that of many conſiderable Authors, but as it is confirm'd by various Experiments in Electricity; ſuch as the capillary Syphon, where, from dropping gently before it is electris'd, it will afterwards flow in a Stream: Likewiſe the Droppings from a Spunge full of Water, which, when electris'd, are much accelerated; with many others.

B. Is there any particular Experiment in Electricity, which proves it to accelerate the Motion of the Blood in a human Body?

A. Yes, one in particular, which ſeems to put it paſt Diſpute; it is an Experiment mention'd by Mr. *Rackſtrow*, in his Eſſay, who ſays,—If a Perſon is electris'd ſtanding on a Cake of Reſin, the Number of Pulſes will be increas'd two, three, or four, in Half a Minute; this ſurpriſing Account of it, I own, I could hardly credit, for which Reaſon I was determin'd to prove it on myſelf; this I did by firſt counting the Number of my Pulſes in Half a Minute, ſeveral Times, when ſtanding on the Floor, and wrote them down in the Window.

That the Experiment might be made as accurately as poſſible, I kept at a due Diſtance from the Clock, ſo as not to be diſturb'd in my Reckoning by hearing the Vibrations of the Pendulum: Then, ſtanding on the electrical Cake, the Perſon at the Clock gave me Notice, by naming the firſt Vibration, loud enough for me to hear; and alſo the laſt: This Method of knowing the Time of only the firſt and laſt Vibration left no Room for Miſtake, particularly as I repeated the Experiment ſeveral Times, which I found to anſwer ſo truly to his Account of it, that it left as little Room for Doubt; his whole Paragraph is as follows:

" The Circulation is increas'd by a Perſon only
" ſtanding upon a Cake of Reſin, and ſo electri-
" fy'd; and the Effects are ſo moderate, that they
" only ſerve to chear and raiſe the animal Spirits;
" for, when it acts the ſtrongeſt, it will increaſe the
" Number of Pulſes three or four in Half a Mi-
" nute, and, when weak, about two; and even
" that, as I apprehend, may prove of very great

" Service; but what tends to the greateſt Good, " are the Shocks given moderately, and with ſome " Judgment; and I am well aſſur'd, that it will " remove many Obſtructions, and be of great Uſe " in paralytic Caſes; it helps Digeſtion, quickens " the Circulation of the Blood, provokes Urine, " and cauſes a freer Reſpiration and Perſpiration. " All theſe I have often obſerv'd, and doubt not " but that many other Things, beneficial to Man, " may farther be diſcover'd; ſuch as may help in " Colic, iliac Pains, Spaſms, Convulſions, Apoplexies, hyſteric, rheumatic, and arthritic Diſ- " orders." Mr. *Rackſtrow*'s *Eſſay*, *p.* 2.

For my own Part, I am thoroughly convinc'd that, as a greater or leſs Quantity of this Fire is convey'd into the Lungs, the Motion of the Blood is thereby either accelerated or retarded.

B. Though you ſeem to make it very plain, don't you think you may poſſibly be miſtaken?

A. Yes, moſt certainly very poſſibly, but what makes it probable that I am not, is, that as the above Experiment clearly proves the one Part to be Fact, *viz.* of a greater Quantity; ſo the other Part is as clearly proved, by obſerving, that, whenever we attempt to breathe the ſame Air over and over again, it will by no Means ſerve for the ſame Purpoſe; nor is it only unfit to preſerve Life, but even common Flame, as above.

That it is unfit to preſerve Life, ſeems abundantly confirm'd, by obſerving the Mortality ſo frequently found in Dungeons, and on Shipboard, particularly the latter, eſpecially in long Voyages; and, the more ſo, the greater the Number of Men, who are crowded under Hatches, where they are oblig'd to breathe the ſame vitiated Air again and again; this, together with their ſalt Proviſion, ſeems greatly to increaſe the Mortality, which is found to leſſen, when they come to Land, particularly if they are not oblig'd to lodge in the Ship; what yet more confirms the Truth of it, is, that, where Ventilators have been made Uſe of to convey freſh Air to their under Decks, thoſe bad Effects ſeem to vaniſh.

The Gaol-Diſtemper, as it is call'd, ſeems likewiſe to be the bad Effects of the ſame vitiated Air; and, doubtleſs, the whole Cauſe of all this great Mortality is from their Breathing ſo much leſs Fire or Æther than what is contain'd in common Air.

And, altho' the Heart is indeed commonly ſuppos'd to be the principal Seat of all that Motion ſo abſolutely neceſſary to ſuſtain animal Life, yet, on Examination, it will appear reaſonable to believe, that the Organs of Reſpiration may rather claim the Office of *Primum Mobile*; for, if we trace the Subject back to its Original, we need but conſider, that, during the Time of Geſtation, when the Fœtus in the Womb is to be conſider'd as a temporary Appendage only, engrafted on the Parent's Body, and its Nouriſhment and Growth ſcarce reſembling an Animal more than a Vegetable; the Circulation, when in that State, being perform'd, to and from it, by the Parent's Lungs and Heart, in the ſame Manner as it is, to and from the ſeveral Parts of her own Body; but, at the Time of the Birth, when the ſame Means of Circulation is at an End, there evidently appears ſomething wanting; ſomething, abſolutely neceſſary to continue the Circulation, which the Heart alone can, by no Means, accompliſh; nor can it yet act as an Animal, till this fluid Fire, this vivifying Spirit, contain'd in Air, has found Admittance into the Lungs, and from thence communicated Activity to the languid Motion of the Blood; for, till then, the new-born Babe continues in a Kind of lifeleſs Condition, but, after this Engine is once in Motion, the increas'd Motion of the Heart immediately follows, Life is produc'd, and the whole animated Machine continues to live, ſo long as theſe two Engines continue in joint Motion, to maintain a perpetual Round of Blood and Fire; but, when once the Motion of either of them is ſtopp'd, the Motion of the other, depending on it, will ſoon ceaſe likewiſe, and the Animal inſtantly expires.

And, tho' many Children are actually born dead, yet many others, which are quite given over as ſuch, might very probably be recover'd, and many valuable Lives ſav'd, if timely Help could be adminiſter'd; particularly, if it were poſſible to form an Inſtrument ſo fitly adapted to the Mouth of the Child, as that the Air, the Noſtrils being clos'd, might be that Way convey'd into the Trachea, by Ventilation, which would, in all Probability, recover it; I mean, while any moderate Degree of the Circulation is remaining.

What induc'd me to meddle with any Thing ſo far out of my Province, was, not only being led to it by the Nature of the Subject, but what I once heard affirm'd by a Midwife, which was, that ſhe had many Times recover'd a Child which was, in Appearance, dead, by forcing in her Breath at the Mouth of it; which, if poſſible to be perform'd, by forcing the vitiated Air out of her own Lungs into the Child's, then how much rather might the Experiment ſucceed, if perform'd by the above Method, with freſh Air endu'd with all its active and enlivening Qualities?

Mr. *Martin* likewiſe, in his *Eſſay on Electricity*, ſeems firmly perſuaded, that the electrical Matter will, in Time, be found very beneficial to the animal Œconomy; and ſays, "Moreover we "know it has a conſiderable Influence on fluid "Subſtances: A glaring Inſtance is that of the

" Syphon and Sponge; by which it appears, that " Fluids in Motion have their Motions greatly " accelerated by the electric Virtue: Thus, if a " Vein be open'd in a Perſon electrify'd, the effluent Blood will project to a much greater Diſtance than it would otherwiſe do: And is not " this a promiſing Indication of ſome great Uſe, " that may be one Time or other deriv'd to the " animal Œconomy from Electricity?"

He likewiſe informs us, that, if an Attempt be made to electriſe a Perſon when ill with the Small-Pox, it proves of no Effect.

B. It ſhould ſeem natural then, from what you have been pleading for, that if a Perſon juſt ſtrangled, ſuffocated, or by any other Means had ſuffer'd a Collapſion of the Lungs, ſo as to be in Appearance dead; if a Pair of your Ventilators could be readily apply'd, he might be recover'd.

A. That many who die ſuddenly might be recover'd, if the above Method were as practicable as it appears to be, and were timely apply'd; and alſo that there is a moſt aſtoniſhing enlivening active Quality in the ætherial Spirit contain'd in Air, on which Life immediately depends; ſeems abundantly confirm'd by the three following Experiments, mention'd by Mr. *Derham*, in his *Phyſ. Theol.* under the Article *Reſpiration.*

The Firſt of which is an ingenious tho' cruel Experiment, of the renown'd Dr. *Hook*, before the *Royal Society*; who cut away the Ribs, Diaphragm, and Pericardium of a Dog; alſo the Top of the Wind-pipe, that he might tie it on to the Noſe of a Pair of Bellows; and, by Blowing into the Lungs, he reſtor'd the Dog to Life; and, then ceaſing Blowing, the Dog would ſoon fall into dying Fits, but by Blowing again he recover'd; and ſo alternately would die and recover for a conſiderable Time, as long and often as they choſe to repeat the Experiment. *Philoſ. Tranſ.* N° 28.

Another Experiment of this Sort was made by Dr. *Walter Needham*, before Mr. *Boyle* and others, at *Oxford*; who hang'd a Dog, ſo that the Heart ceas'd Moving, but haſtily opening him, and by blowing Wind into his Lungs, put the Blood in Motion, and by that Means the Heart, and ſo recover'd the Dog to Life.

The third Experiment was made by Dr. *Croon*, of *Greſham College*, before the *Royal Society*, on a Pullet, which he ſtrangled, ſo as no Sign of Life appear'd, but by blowing Wind into the Trachea, and ſo ſetting the Lungs a Playing, brought the Bird to Life again.

B. Though this muſt be allow'd to be moſt wonderful, yet as we are inform'd by the greateſt Philoſophers, as well as many modern Chymiſts, that Æther, or the ætherial Spirit, univerſally diſpers'd, is the Cauſe not only of muſcular Motion, but of all the Motion in the Univerſe, and as all this ſeems ſo probable, we have not ſo much Reaſon to wonder at all theſe leſſer Effects; however, ſuch Things as theſe muſt be ſufficient to inform us, that ſomething more is perform'd, than what is commonly apprehended by moſt, when they ſimply, and in the common Phraſe, ſpeak of Blowing Wind down the Throat.

Surely as this ætherial Medium is obſerv'd ſo abſolutely neceſſary, not only at the firſt Formation of the Fabric, but likewiſe all the Time of the Increaſe, or, if I may be allow'd the Expreſſion, all the Time of its Building up; it muſt naturally diſcover a conſtant Tendency to the Repairing of many of the Breaches that may caſually happen to it; which Repairs, if your electrical Æther were capable of performing, this perhaps might prove more convincing, that it was the very etherial ſubtil Medium of Philoſophers, than all your former Reaſoning and Experiments put together.

A. Nothing can be more plainly diſcover'd than the ſalutary Effects of Æther, even of that Portion contain'd in Air, if we were only to conſider how much a fine and pure Air contributes towards the Recovery of loſt Health: And if electrical Æther, and the univerſal Æther, or ſubtil Medium of Philoſophers, are the very ſame identical Subſtance; that then electrical Æther muſt neceſſarily, as you obſerve, diſcover a natural Tendency to heal; and that it does actually diſcover ſuch a Tendency, the following ſeveral Caſes ſeem clearly to prove: And, to ſay the Truth, it was Accounts of ſome very remarkable Cures mention'd in the public Papers, which induc'd me at firſt to get an electrical Apparatus, and with no other View than to make Experiments of that Kind, being fully perſuaded, that ſo extraordinary a Phænomenon was never diſcover'd to us, but to anſwer ſome very valuable End; and, tho' I began Experiments of this Kind at all Adventures, and at the greateſt Random poſſible, yet I had the Pleaſure and Happineſs to ſucceed, far beyond my Expectation, and will therefore give you a faithful Account of various Caſes, wherein I have had the Opportunity to find electrical Treatment of Uſe.

Electricity apply'd to the Cure of bodily Diſorders.

1. A Servant of Mr. *Tilt*, of *Bromſgrove*, ten or twelve Miles from *Worceſter*, afflicted with a violent and conſtant Head-ach for near a Fortnight, was twice electris'd, at Half an Hour diſtant from each other, and cur'd; who, coming again that Day Fortnight, declar'd he never had any Return of it afterwards.

The Manner of the Operation was a few light Shocks in the Head.

2. Mr. *Robert Soule*, in *Worceſter*, troubled with a Sciatica for many Years, was cur'd at one Operation; after which, I did not remember to have ſeen him for near a Year, at which Time he declar'd, that he had ever ſince been free from it.

The Operation was Shocks likewiſe, convey'd to the Part affected.

3. *William Jinks*, of the Hoſpital in *Fryer-ſtreet*, *Worceſter*, troubled with a Rheumatic Pain in the Knee for eight Years, and, at ſome Times, ſo bad, as to have but little Reſt Day or Night, particularly when in Bed; but, after Making Uſe of the electrical Machine a few Days, was eas'd of his Pain, ſo that he could reſt well; and, tho', before, it was with Difficulty that he walk'd with a Staff, yet was, ſoon after, able to go without it.

The Operation was ſometimes Shocks, ſometimes ſimply Drawing off Sparks, which is commonly perform'd thus:

Let the Perſon ſtand on the electrical Cake, and another, ſtanding on the Floor, bring an iron Rod, or a Finger, near to the Part affected, at which Time Sparks of Fire will be ſeen to dart from it.

4. *John Broome*, having, for ſome Days, complain'd of a very bad Pain juſt above his Eye-brow, which, he ſaid, was much like the Head-ach, only fixed to that particular Part, was cur'd in a few Minutes.

The Operation was Shocks at the Part affected.

5. Mr. *Higgins*, in the *Lich-ſtreet*, *Worceſter*, troubled with a partial as well as periodical Head-ach for near ſix Weeks, from the Top of his Forehead, or right Temple, down to his Ear, which commonly began at Five or Six o'Clock in the

Evening, and held till he went to Bed, was cur'd in a few Minutes.

The Operation was ſimply Drawing Sparks from the Part affected.

6. *Margaret Dancocks*, near *Sidbury-gate*, *Worceſter*, was afflicted with an almoſt conſtant as well as violent Pain in the Hinderpart of her Head, for near three Quarters of a Year; but worſt of all, when ſhe firſt lay down in her Bed, being then ſo intolerable, ſhe could not forbear Shrieking; having made Uſe of all Means in her Power, to no Effect, was very ſoon reliev'd of the Violence of the Pain, by being electris'd once a Day, and, after continuing it ſome Time longer, declar'd herſelf perfectly cur'd.

The Operation was Drawing Sparks, and ſome light Shocks, convey'd to the Part affected.

7. The ſame Perſon had been afflicted with the moſt violent Cramp in her Legs I ever heard of, which Diſorder ſeiz'd her before ſhe was twenty Years of Age, and continu'd till the Operation was perform'd, when ſhe was upwards of Seventy: This was moſt violent always when in Bed, at which Time ſhe was forc'd to tumble out on the Floor, and there continue till it was over, were the Weather ever ſo ſharp, and this, ſometimes, twice or thrice the ſame Night; the violent convuls'd muſcular Parts forming themſelves into diſtorted Ridges, attended with exquiſite Pain, burſting the ſmall Blood-veſſels, which afterwards appear'd of a livid Hue for a conſiderable Time: This was entirely cur'd in a few Days.

The Operation was Shocks only, and perform'd, once a Day, thus: Having taken off her Shoes, ſhe put one Foot on the End of the Chain which came from the charg'd Phial; then, putting the lower End of a large Wire, or ſmall iron Bar, to the other Foot, and, at bringing the other End to the excited Apparatus, the electrical Matter was convey'd thro' both Legs at the ſame Time. *By Experiment* IVth.

8. Another, who had ridged Knots in the Thigh, in Form like what appear in violent Cramps, tho' much more ſoft, and leſs painful: Thoſe were entirely diſſipated, in a Minute or two, by ſimply Drawing Sparks from the Parts affected.

9. *Mary Bradley*, of St. *Peter*'s, *Worceſter*, very much afflicted with a Rheumatic Pain in her Shoulder and Arm, for near three Quarters of a Year, but moſtly when in Bed; nor was ſhe able to dreſs herſelf: Her Diſorder was ſuch, as ſeem'd out of the Power of Medicine to cure, having been an Out-patient of the Infirmary for four Months, without Succeſs; was, by Help of the electrical Machine, ſoon reliev'd of her Pain, and able to do her Buſineſs; and, tho' it is now a Year ſince, ſhe ſtill continues eaſy and well.

The Operation was ſometimes by Shocks, ſometimes Drawing Sparks from the Part affected.

10. *Anne Thomaſon*, in *Little Fiſh-ſhreet*, *Worceſter*, was troubled with a Fiſtula near the inner Corner of her Eye, which healed, and broke again ſeven Times, yet was fearful of putting herſelf into the Hands of a Surgeon, becauſe ſhe was inform'd it would be neceſſary to make an Inciſion in her Noſtril.

The laſt Time it heal'd, it continu'd well a conſiderable Time; after which, it began, at the ſame Place, with a very ſmall Swelling, and continu'd growing larger, till it was as big as a Filbeard; at which Time one of her Neighbours adviſ'd her to try the electrical Machine, which ſhe did, and ſoon found it grow leſs and leſs, and ſo continu'd doing, till it was entirely diſſipated, and has continu'd well for more than two Years, without

out the leaſt Symptom of any Return of the Diſorder.

The Operation was ſimply Drawing Sparks from the Part affected.

The following Account was written by the Gentleman himſelf, on whom the Cure was perform'd:

11. " A Gentleman in *Worceſter* had the Miſ-
" fortune of running the Point of a Bodkin into
" the Inſide of his Hand, near the fore and mid-
" dle Fingers: The Wound was ſo ſmall, it was
" ſcarce to be ſeen the fourth Day, and afterwards
" not at all, and was, in Reality, no more than
" the Prick of a large Pin; yet, in three or four
" Days, a Swelling came on, not only in the
" Palm, but likewiſe on the Back of the Hand.

" The fifth Day, upon a greater Uneaſineſs in
" the Hand, a Surgeon was call'd in, who, du-
" ring the Space of three Months, apply'd Pul-
" tices, Fomentations, the ſtrongeſt drawing Plaiſ-
" ters, *&c.* both to the Inſide and Outſide of the
" Hand, yet all to no Purpoſe: As no Medicine
" would affect the Swelling, a Cauſtic was ap-
" ply'd, but with no more Succeſs than all the
" other Means; whenever this inveterate Swelling
" was touch'd or preſs'd, it left a Dent in the Back
" of the Hand, like what we ſee in the Fleſh of
" dropſical Perſons.

" The Swelling ſtill continu'd, and no Altera-
" tion, nor Likelihood of any. Upon Reading the
" *Gentleman*'s *Magazine* for 1749, he obſerv'd great
" Things had been done by Means of Electricity;
" he therefore applied to one in the Neighbour-
" hood, who had an electrical Machine, and was
" electrify'd twice on the Inſide of his Hand, at
" the Bottom of the middle Finger; in four Days
" it broke there; he was then electrify'd on the
" Back of the Hand, oppoſite to the Inſide; juſt
" at the ſame Space of Time it broke on the Back,

" and diſcharg'd a good Deal of Matter, and, in " about three Weeks, heal'd."—This Operation was ſimply Drawing off Sparks.

12. The very ſame Gentleman, about two Years after, had the Misfortune of a Mortification, which began in his Toe, and gradually increas'd, notwithſtanding all the beſt Methods were us'd which could be thought of.

As the Uſe of the Machine had ſo good an Effect on his Hand, I prevail'd with him to try it twice on his Toe.

Soon after this the Surgeon ſaw me, and aſk'd me, when I electrify'd Mr. *W*——'s Toe; I told him, two or elſe three Days before: He reply'd, the Mortification was ſtopp'd. But, notwithſtanding this promiſing Aſpect, together with the ſalutary Effect on his Hand beforementioned, he, like one infatuated, neglected the Uſe of thoſe Means, and the Mortification came on again; which he ſuffer'd to increaſe very much, before he could be prevail'd on to make Uſe of it again. This caus'd me to tell him, if he would not make Uſe of it in Time, I ſhould much rather he would give over all Thoughts of it; but he ſeem'd, notwithſtanding theſe Neglects, to have a very great Opinion of it; that he dream'd of it, and that he muſt and would be electrify'd again: Accordingly he got an electrical Machine into his Houſe, though I muſt own, by that Time, I had not much Hopes of its being of any conſiderable Service to him; however, Electricity was again made Uſe of, and the electrical Virtue to paſs, with ſome Violence, thro' the mortify'd Part.

The next Morning, when it was opened, the Surgeon ſeem'd aſtoniſh'd at ſeeing ſuch an Alteration, and aſk'd Mrs. *W*——, who ſtood by, what had been done to it? She deſir'd to know why he ſeem'd ſo ſurpris'd, and if he thought it better? Better, yes, reply'd he, by fifty per *Cent.* for now it diſcharges good Matter, and ſtill deſir'd to know what had been done to it: She told him, nothing but electrify'd, and ſaid, that that muſt needs be the Cauſe of the ſudden Change for the better; and, though he told her he could not believe it was capable of producing ſuch Effects, yet he order'd, that, whatever had been done, might be repeated; it was accordingly twice electrify'd that Day; and though, next Morning, it had not diſcharg'd quite ſo much as before, yet ſhe ſaid he told her, there had been more good Matter diſcharg'd, at thoſe two Dreſſings, than there had been for five or ſix Weeks before, and deſir'd it might ſtill be continu'd, not twice, but once a Day.

As the Diſorder was at this Time far advanc'd, and as all other Means prov'd ineffectual, if finding it ſtill yield to this Sort of Treatment would be thought ſomething ſurpriſing, how much more ſo, to find, that, after ſo many favourable Circumſtances, he ſhould refuſe to make Uſe of it again? But this was the very Caſe; and his Reaſon was, it gave him Pain, which in all Probability was, in that Diſorder, no bad Symptom.

Had he purſu'd it at firſt, it might, in all Probability, have had as ſalutary an Effect as before on his Hand; for, in all Likelihood, if that had been neglected much longer, that too muſt have mortify'd, becauſe it appear'd as if the Circulation was nearly ceas'd, and Medicine not to have the leaſt Effect; but, as ſoon as the Palm of the Hand was electrify'd, the Fluids, which were before almoſt at a Stand, began then to move, as if they had been juſt inſpir'd with new Life; for, from that Time, the very Part gradually aroſe, came to a Head, and broke.

And, notwithſtanding all the Appearances abovementioned, this might be thought to be nothing more than a lucky Turn of the Diſorder, which happen'd juſt at that Time; yet the Electrifying the Back of the Hand afterwards, and which, as the Gentleman himſelf informs us, had the ſame Effect, and brought it to a Suppuration in the very ſame Space of Time, is not only a plainer Proof that Electricity was the Cauſe, but alſo, in ſome Meaſure, ſeems to promiſe ſtill greater Advantages to Mankind, when more frequently apply'd to Diſorders incident to the human Body, and when Time and Experience ſhall have pointed out the particular Diſorders which ſeem beſt adapted to ſuch electrical Treatment.

The Operation was Shocks only; thoſe were brought from the Toe, outwardly, through the Dreſſing and ſeveral Folds of Flannel, by bringing the Chain from the Coating of the Phial to the Knee, then laying one End of a large Wire, or ſmall iron Rod, to the Extremity of the Toe, and bringing the other End of the Rod to the excited Apparatus. The Circuit being thus form'd, the Shock was given, and the Circulation perform'd, ſo as to paſs outwardly from the diſeas'd Part.

N. B. The Fire could be plainly ſeen, between the End of the ſmall Rod and the flannel Dreſſing at the End of his Toe, every Time the upper End of the Rod was brought to the excited Apparatus.

13. A young Lady had the Misfortune of a Strain of the Knee-joint, or rather the crural Ligament, together with a low-ſpirited Diſorder, perhaps hyſterical; this ſeem'd to be heighten'd by the other Misfortune, and increas'd to that Degree as to bring on a Kind of fainting Fits, which ſometimes follow'd each other ſo faſt, as to have two or three of them ſucceſſively. Thoſe, though they were in Appearance exactly like ſwooning Fits, yet, in this ſeeming inſenſible State, ſhe could

hear and underſtand what was ſaying or doing, but had no Power to ſtir.

This Diſorder ſeem'd as ſtubborn as the other Malady; and the Surgeon was of Opinion, that, ſo long as it continu'd, the Lameneſs would grow worſe, which accordingly happen'd.

As all Attempts had hitherto prov'd unſucceſsful, ſhe try'd the Bath, but to little Effect.

About three Quarters of a Year after the Accident happen'd, electrical Treatment was advis'd, and accordingly made Uſe of. When ſhe firſt came to me there appear'd no Swelling, but, on the contrary, the muſcular Part of the Leg much fallen away; a continual Coldneſs alſo attended the Foot.

Electricity, for the firſt Month, ſeem'd to have but little Effect; but, the ſecond, there was a viſible Alteration for the better; the next Month after, it mended ſurpriſingly, ſo that ſhe began to exerciſe it, by firſt attempting to walk a few Steps each Day, without Crutch or Staff, which, as ſhe inform'd me, ſhe could perform without Pain. I advis'd her to find out the Number of Steps ſhe could accompliſh without Pain, and then to add one to the Number each Day, which ſhe did, and afterwards two each Day; thus it continu'd, mending in the ſame ſurpriſing Manner, this ſecond Month, particularly after leaving off the cold Bath: At the End of the next Month, which was the third after it began to mend, ſhe was grown ſo well as to attempt the going down with a Country Dance, and began to think of leaving off the Uſe of Electricity.

Finding ſhe did not attend as uſual, I ſent her a ſmall Epiſtle, to inform her, that, although ſhe might think herſelf nearly well, yet I could not help thinking, that what had been ſo long and ſo conſtantly practis'd, ought not to be left off all at once, for Fear of a Relapſe; but, notwithſtanding this, ſhe came not again, till ſhe was convinc'd that what I ſuſpected was coming on her, for ſhe ſoon found a very viſible Relapſe, and was oblig'd to return to the Uſe of Æther again, and, when ſhe had recover'd the Relapſe, to leave off the Uſe of it more gradually *: But when ſhe left it quite off, it appear'd a finiſh'd Cure, of not only the Lameneſs, but of the Fits likewiſe, and the Coldneſs of the Foot; the Leg alſo, which had been in a Kind of pining Way, appear'd as full of Fleſh, and as tight and well braced as the other.

The Operation was Shocks chiefly for the grand Complaint, but, to help the Fits, the Manner in which it was perform'd was thus:

To a Chamber, at four Rooms Diſtance from the Machine, were Wires convey'd, ſupported with ſilken Strings, where the young Lady ſat in a Chair, each Leg of the Chair being ſupported with a Cake of Reſin; her Feet were alſo ſupported with another large Cake, ſo that a Communication, of the electrical Æther, with the Earth, was entirely cut off; thus ſhe ſat ſupported for Half an Hour at leaſt, in which Operation nothing is felt; the Whole of which appears to be perform'd by Reſpiration only.

The Shocks were always firſt perform'd before ſhe ſat in the electrical Chair †, and perhaps fifty, ſixty, or more every Night; at each Shock, the Fire was made to paſs through that Part of the Knee where the Diſorder lay; as to the Operation, ſhe, with the Aſſiſtance of a Maid-ſervant, could,

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* After the Relapſe, the Progreſs of the Cure was much more tedious than before; and it was four or five Months longer, e're the Uſe of Electricity could be quite left off.

† Becauſe, ſometimes after Heating by long Friction, the Globe acts not ſtrong enough to cauſe a Shock.

with proper Directions, perform it herſelf, thus: The Condenſing-phial was ſuſpended on a convenient Part of the Apparatus of Wires, and, a Piece of Chain being faſten'd to it, the other End of it was brought to one Side of the Knee; then taking a Wire in the other Hand, one End of which being laid to the oppoſite Side of the Knee, the Shock was produc'd by guiding the other End of the ſaid Wire to any Part of the excited Apparatus; by which Means the electrical Æther paſs'd through the Part affected, by being made a Part of the Circuit *, as at Experiment the 4th.

14. A young Lady was very much afflicted with Fits for near ſeven Years, which ſeiz'd her without giving any Warning, and threw her flat on her Face; for which Reaſon it was dangerous to go near the Fire, or even walk abroad by herſelf, notwithſtanding ſhe ſcarce ever, excepting once, continu'd in that inſenſible State ſo long as a Minute, and oftentimes not half ſo long.

Their Returns were very frequent, ſometimes twice in a Day, though ſometimes perhaps, after beginning with a freſh Medicine, ſhe would find ſome Relief; but nothing could be found which was likely to prove an abſolute Cure, till Electricity was advis'd and comply'd with: What render'd the Cure the more difficult, was a very great Coldneſs in the Feet, and Phyſicians were of Opinion, that the Fits would not be eaſily conquer'd, except the Coldneſs of the Feet could be firſt remov'd; this I did not know till afterwards, but, as ſhe told me, it ſometimes ſeem'd to begin in her Stomach, I was not much at a Loſs to know how to convey the Fire through both Stomach and Head at the ſame Time; for, whatever be the Part

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* Some like Operations were made Uſe of, to convey it to the Knee, Leg, and Foot, all at once.

affected, and I have a Deſire to paſs the Fire through that particular Part, it is only to form a Circuit as in the Manner deſcrib'd by Experiment the 4th, and to cauſe that particular Part to make a Part of the Circuit, and it is done: And ſince it is equal, by the ſame Experiment, whether the Circuit be long or ſhort, the moſt eligible Way muſt be to have her ſtand upon the Wire or Chain coming from the leaden Coat of the Condenſing-phial, and then to compleat the Circuit by laying another Wire to any particular Part of her Head, by which Means the Fire will be convey'd to that particular Part of it; for, as the Line of Direction of the Fire is always the ſhorteſt poſſible, by always taking the neareſt Way, as is evident by that Experiment, it may be guided to a very great Exactneſs; this being the Method which was taken, and the Fire going through the Feet, as well as the Stomach and Head, all ſeem'd to receive an equal Share of the Benefit, and a compleat Cure was effected, both of the Fits and Coldneſs of the Feet; and both appearing to be gradually conquer'd at the ſame Time.

The Operation was Shocks only; and the ſubtil Medium perform'd the Circuit from the Sole of the Foot, through the Crown of the Head.

Concerning Motion being communicated to extravaſated Blood.

The Experiment was this:

15. A Perſon having a dark livid Spot under the Eye, from a Blow three Days before; it was, in leſs than a Quarter of an Hour ſo taken out, or rather the Circulation ſo carry'd on, that there only remain'd a faint Mark where it had been.

The Operation was ſimply Drawing Sparks from the Part affected.

16. The ſame Perſon had a Swelling between the Neck and Shoulder-blade as big as an Egg, and nearly as hard, which had been growing to that Size for ſeveral Years: She had not been many Times electris'd before it began to ſoften, and, ſoon after this, to diſcharge a thin Kind of Humour thro' a ſmall Orifice, and continu'd diſcharging, and gradually ſoftening, till it was entirely diſſipated.

The Perſon call'd it a Wen; but I thought it much harder than they commonly are.

Theſe Kind of Operations are beſt perform'd by electrifing the Perſon on a Cake of Reſin, and another ſtanding on the Floor, to bring an iron Rod, large Wire, or elſe his Finger, ſo near the Part, that the Sparks may be drawn from it; and this to be repeated each Day, for five or ſix Minutes.

17. A young Woman, by Drinking too freely at a cold Spring, when over-heated, was afterwards ſeiz'd with a feveriſh Diſorder, which continu'd for a Quarter of a Year, or more; at which Time a Number of red Spots began to appear on her Arms, out of which ſeem'd to breathe ſuch Effluvia, as ſoon condens'd into a thin, dry, cruſty Subſtance, that appear'd rather as Scales than Scabs, and theſe from her Elbows down to her Fingers: This Diſorder continu'd on her for near three Years, which the firſt and ſecond Winter very much leſſen'd, but the third Year it continu'd the ſame in the Winter likewiſe.

The next Summer ſhe began to make Uſe of Electricity, and, in three Weeks or a Month, moſt of thoſe Scales diſappear'd: Before this, ſhe had a remarkable dry Hand, but, after theſe Electriſations, as remarkably moiſt, inſomuch as to be troubleſome when at her Needlework.

The Operation was ſimply Drawing Sparks from the Parts affected, once a Day.

18. *Eliſabeth Bund*, near the *Old Hills*, in the Pariſh of *Powick*, a few Miles from *Worceſter*, had, for fifty Years paſt, been afflicted with ſevere Fits; which, like an Epilepſy, gave her no Warning of the approaching Danger, but threw her down in an Inſtant on the Ground, and continu'd her in a State of total Inſenſibility for a conſiderable Time: As the Number of Attacks were ſometimes twice, and ſometimes thrice in a Day, ſhe found it extremely dangerous to go near either Fire or Water; from the Firſt, by being too near it when the Fit came, ſhe has twice been a dreadful Sufferer, having two of her Fingers burnt off, and her Face and Neck greatly disfigur'd by the Fire, during her inſenſible State.

But being in *Worceſter*, the latter End of the Year 1752, and accidentally relating her unhappy Situation to me, I was ſtrongly inclin'd to try if the electrical Shock might prove of any Efficacy in ſuch a Caſe.

She deſir'd earneſtly to make the Trial, as ſhe had try'd other Means in vain; and found, upon her Return Home, ſuch a ſurpriſing Amendment in herſelf, as encourag'd her to come to *Worceſter*, from that Time to the Year 1754, as often as ſhe had an Opportunity, to repeat the Operation; the Conſequence of which was the gradual Decreaſe of an inveterate Head-ach, which attended her Diſorder, and, at laſt, the total Ceſſation of the Fits themſelves; for, inſtead of being ſeiz'd with them twice or thrice a Day, after ſhe had began theſe electrical Operations, ſhe had no more than about four of them, and thoſe greatly weaken'd, from that Time to *Chriſtmas*, 1753; and as, ſince that, they have not return'd again, there is ſufficient Reaſon to hope they never will. *Sign'd* September *the* 12*th*, 1754.

The Operation was Shocks chiefly, and, in thoſe, the Fire was guided, for the moſt Part, thro' the Arm and Head, for Want of better Knowledge at that Time; for, if a ſimilar Caſe were now to offer, I ſhould be more inclin'd to paſs it quite thro' the whole Body as well as the Head, as at Caſe the 14th.

19. A young Gentlewoman, of the Pariſh of *Clifton*, about ten Miles from *Worceſter*, ſome Time after, being recover'd of a Fever, was ſeiz'd with violent Hyſterics; the Effects of which were ſo bad, as very ſoon to deprive her of both Memory and Underſtanding; and ſo continu'd for a conſiderable Time, notwithſtanding the beſt Advice of two eminent Phyſicians.

In this melancholy State ſhe was brought to *Worceſter*, to try the Effect of Electricity; I told the Perſon who brought her, it would be neceſſary to perform the Operation, at firſt, in a very ſlight Manner, leſt it ſhould ſtartle her, and by that Means ſo intimidate her, as to prevent her Coming again; but ſhe reply'd, there was no Danger of that, for ſhe could not remember Half an Hour to an End.

As the Head was the Part affected, I guided the Fire chiefly to that Part, in as plentiful a Manner as I well could, and caus'd it to paſs quite thro' ſeveral Times each Day, ſo long as ſhe ſtaid in Town, which, tho' ſcarce a Week, yet it ſeem'd to have the deſir'd Effect; for altho', before ſhe came to *Worceſter*, ſhe could not remember Half an Hour to an End, yet, ſoon after her Return Home, ſhe could remember moſt remarkable Things ſhe ſaw done in *Worceſter*; and not only her Memory, but her Underſtanding alſo return'd, and ſhe very ſoon became perfectly well.

The Operation was ſometimes Shocks, ſometimes Drawing off Sparks from the Head.

20. Mrs. *Higgins*, in the *Lich-ſtreet*, *Worceſter*, troubled with a low-ſpirited hyſterical Diſorder, was afflicted alſo with a Coldneſs in the Feet for many Years: From this Coldneſs in the Feet, a Coldneſs could be plainly perceiv'd to move gradually quite up to her Head, in Half a Minute's Time, or leſs, which would then appear like a Palſy in her Head; and, very ſoon after, ſuch a Chattering of the Teeth would enſue, as we ſometimes behold in the moſt violent ſhivering Fit of an Ague; from thence this Shaking proceeded to her Arms, and all over her Body; and, as Hyſterics, mimic moſt other Diſorders, the Shaking was ſo violent, and appear'd ſo active, as if it was rather inclin'd to mimic the St. *Vitus*'s Dance than the Palſy.

The Returns, or Fits of this ſhaking Diſorder and low-ſpirited Complaint, were very frequent for upwards of ten Years, notwithſtanding all the Means made Uſe of; but, after being electris'd once a Day, in leſs than a Fortnight's Time, went entirely off; and, by continuing the Uſe for ſome Time longer, was much higher in Spirits, and the Coldneſs of her Feet quite cur'd.

The Operation was ſometimes Shocks, ſometimes ſimply Drawing off Sparks; but the longeſt Operation was ſimply Electrifying, *viz.* Standing on the electrical Cake only, and Breathing the celeſtial Fire, which, perhaps, was performed for the greateſt Part of Half an Hour.

21. *Eſther Hopkins*, of *Tedney* near *Whitbourn*, about ſeven or eight Miles from *Worceſter*, was troubled with a very painful Swelling in the Ball of her great Toe for ſome Years; the Pain was greateſt of all, when in her Bed; having, in vain,

made Uſe of other Means, came to *Worceſter* to try the Effect of Electricity.

After the firſt or ſecond Operation, the Pain was much abated; and ſhe told me, with Pleaſure, the next Morning, ſhe had ſlept comfortably, and had more Reſt than in any Night for a conſiderable Time before; and, after continuing the Uſe of it for a ſmall Time longer, the Swelling gradually aſſwag'd, and the Pain left her.

The Operation was Setting her on a Cake of Reſin, and, after conveying the electrical Æther on her, a Finger, or Piece of Metal, was brought ſo near to the Part affected, as to draw off Sparks. ——This is oftentimes call'd, ſimply, Drawing off Sparks.

22. *John Webb*, in *Fiſh-ſtreet*, *Worceſter*, ſeventy Years of Age, was troubled with a very painful Diſorder in his Feet, for ten or twelve Years, which, he had been inform'd, was the Gout; a general Coldneſs alſo of the Feet attended the Diſorder, which was ſometimes ſo great, that, if he ſat ſtill in cold Weather, he was almoſt inſenſible of the other Pain; and, if he warm'd them by the Fire, it caus'd them to rage in ſuch a Manner, as ſcarce to be borne; and alſo in Bed, when any Warmth came on, eſpecially in the Ball of one of his great Toes, which was ſo intolerable, that, many Times, after two or three painful Hours, he was forc'd to get up, and perhaps ſit ſtarving with Cold in a Chair, being ſcarce able to walk, for the Greatneſs of the Pain: If he made ſhift to ſtay in Bed, to make it tolerable, he was oblig'd to prop up the Bed-clothes with his other Foot.

The Nails of his Toes, very frequently, dropp'd off all at once, if he did not prevent them, when they were become looſe, by pulling them off; the Toes in general appear'd of a livid Hue, and the Circulation was ſo much retarded in the whole

Foot, as to produce Symptoms of a Mortification; large black or dark livid Spots were frequently form'd on the Top and Sides of his Feet, and at the Ends of his Toes; thoſe, when they firſt came, were exceeding painful, and, at that Time, he durſt not much tamper with them; but, in ſome longer Time, they grew quite dry and hard, and then he could cut them out with a Penknife, and, perhaps, without making them bleed; but, if he attempted to open them, before they were grown dry, they continu'd ſore for a long Time; theſe were ſo frequent, and ſo painful, particularly at the End of his ſecond Toe, he had ſometimes determined to have it cut off, or, at leaſt, the upper Part of his Toe: Beſides theſe, he had another Complaint in his Heels, which were generally puff'd up like blown Bladders.

Every one of theſe Complaints, by being electris'd once a Day for ſome Time, and afterwards twice a Week, gradually decreas'd; and are now * ſo far conquer'd, as to have no painful, reſtleſs, and tedious Nights, no Nails dropping off as uſual, no Coldneſs in the Feet, nor bloated Heels, no intolerable Pain in the Ball of the great Toe, no more Signs of Mortification; but the Blackneſs of the upper Side of the Toes are changing to their natural Colour, and the chief Remains of Complaints are, now, rather a Soreneſs or Tenderneſs in the Feet, attended ſometimes with a Tingling, which is probably the ſalutary Effects of the accelerated Motion of the Blood; as when any particular Part by being preſs'd or bound too hard, the Motion of the Blood has been ſome Time retarded; after which, at removing the Obſtruction, when the Blood goes on again, we frequently, at ſuch Time, find a Tingling.

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* Sign'd *February* 20, 1756.

This perhaps might be one of the beſt of Symptoms.

Quary, Whether, inſtead of the Gout, the Foundation of all thoſe Complaints were not a too languid Motion of the Blood, particularly in the Feet; for, although ſuch a Complication of Diſorders, yet each one, in Appearance, was the Effect of ſuch an undue Circulation; and what ſeem'd to confirm it, was, that, when the Motion of the Blood was accelerated, which was known by his Feet growing warmer, every one of the other Complaints mended as it were together, or all at once.

The Operation. Sometimes at firſt, when at worſt, ſimply Drawing Sparks, but afterwards chiefly Shocks; and, as the Diſorder lay altogether in the Feet, the Method was, to bring the Chain from the Phial to the Part affected of one Foot, and then lay one End of a Wire or ſmall iron Rod to the Part aggrieved of the other Foot, bringing the other End of the Rod to the Gun-barrel, or other Part of the excited Apparatus; and the Shock ſucceeded, and the Circulation was perform'd the neareſt Way through the Patient, from one metallic Body to the other; which, in ſuch a Caſe, muſt be up one Leg and down the other, of which the Knees were very ſenſible.

23. Mr. *Joſhua Wade*, in *Perſhore*, nine Miles from *Worceſter:*

Troubled for ſeven or eight Years with a painful Diſorder in his ſecond Toe, and though as tender as a Boil, yet was there nothing to be ſeen; the Pain was ſo great, particularly in Walking, he was determin'd to have it cut off at the firſt Joint.

This troubleſome Malady was cur'd at one Operation, which was perform'd by electrifying him on a Cake of Reſin, and with an iron Stile drawing Sparks from the Part affected.

24. Mr. *Edmund Yeates*, of *Hennick*'s-*hill*, near *Worceſter*, afflicted for two or three Months with a violent Pain in the lower Part of his Back, Loins, Hip, and down the Side of his Thigh; was cur'd with a few of theſe electrical Operations, which were perform'd by conveying Shocks to the Parts affected.

25. Mr. *Bibb*, of *Hennick*'s-*hill*, troubled with a violent rheumatic Pain in his Arm, which had continu'd ten or twelve Years, particularly when in Bed; this was ſometimes ſo intolerable, as to cauſe him, in a Kind of Frenzy, to ſtrike it with Violence againſt the Bed-poſt; and by Degrees he had brought himſelf to ſuch a Habit of ſtriking it, that he imagin'd it aſſwag'd the Pain:

Was cur'd by the ſame Kind of electrical Treatment, as above, *viz.* Shocks convey'd to the Arm.

26. A Perſon in *Mealcheapen-ſtreet*, *Worceſter*, had, within the Space of two or three Years paſt, ſeveral Attacks of the Gout, ſince the firſt of which, he had always a Stiffneſs and Pain in the Joint of one of his great Toes, and for a conſiderable Time in both, particularly if he walk'd much; was quite cur'd with a few of theſe electrical Operations, which were perform'd by ſetting him on a Cake of Reſin, and ſo electriſing him, while a Perſon on the Floor brought his Finger ſo near to the Part affected, as to cauſe the Sparks of Fire to burſt from it.

27. *Eliſabeth Taylor*, of *Hennick*'s-*hill*, near *Worceſter*, troubled with ſo ſevere a Head-ach, that it was thought to proceed from a Fever in the Brain; having baffled all the Efforts of Medicine for eleven Years, was cur'd by Means of Electricity in a few Weeks.

The Method of Treatment was by conveying the electrical Æther through her Head, by Way of Shocking.

28. The ſame Perſon, after taking Cold, was ſeiz'd with a ſore Throat, which continu'd growing worſe for the Space of ſix Days; at which Time ſhe attempted to ſwallow a Bit of Bread, after it was ſoak'd in her Tea; but, the Taſk proving too hard, it caus'd her to retch and throw up the Tea ſhe had been drinking: The ſame Morning ſhe came to Town to try the Effect of Electricity, and was ſo much mended by the Time ſhe got Home again, as to eat ſome boil'd Mutton; and continu'd mending ſo faſt, that two more of thoſe Operations made a perfect Cure on her, excepting a ſmall Hoarſeneſs, which continu'd ſomething longer.

The Method of Cure was thus:

One End of the Connecting-wire or Chain being brought to one Side of her Neck, at ſome Diſtance from the Part affected, a ſmall iron Bar was laid as far on the oppoſite Side; then, at bringing the other End of the Bar to the excited Apparatus, the electrical Æther, as uſual, paſs'd through it in a Right-line, from one metallic Body to the other; by this Means it is very eaſy to guide it through any particular Part.

29. Having obſerv'd the great Efficacy of electrical Æther, in ſoon relieving moſt Kind of Inflammations, I was very much inclin'd to think the ſame ſalutary Effects would appear, when apply'd to the St. *Anthony*'s Fire; but, when a Caſe of that Sort offer'd, the Inflammation was ſo great, that, at firſt Sight, I almoſt deſpair'd of Succeſs.

About the Middle of the Day I had the firſt Trial, and, before Night, the angry Swelling was much appeas'd, and in a few Days quite cur'd.

The Operation was ſimply Drawing off Sparks, with a Finger or an iron Stile, while ſhe was electrified on the Reſin.

30. Mr. *Perkins*, Surveyor of the Roads, a

Year or two ago, had a ſlight Touch of what he thought to be the Palſy, or ſomething near a-kin to it; for, all on a Sudden, his Arm dropp'd down as effectually as in any paralytic Stroke, but by rubbing it, the Uſe of it was again ſoon reſtor'd.

The ſame Day he had another, and, in ſome little Time after, he had a Third, which ſtill, after it had been well rubb'd and chaf'd for a Time, became ſo well again as to have the Uſe of it, particularly at the upper and middle Joint; but the lower Part of it was by no Means ſo ſtrong as before, nor could he have wrote his Name, if he might have gain'd the *Indies* by doing it: After this, he had a Deſire to try the Effect of the electrical Shock, which reliev'd him ſo effectually as that he was very ſoon perfectly well again; the Operation was Shocks in the Arm.

31. The ſame Perſon had lately a much worſe Stroke of the ſame Kind; all the right Side was ſo affected, that he could not walk without the Aſſiſtance of two to ſupport him; when it firſt happened, he was out of Town, ſo that it was two or three Days before he could apply for Help again the ſame Way: After he had made Uſe of Electricity two or three Times, he was able to walk with the Support of one only; and, in a Fortnight or three Weeks, without any one to aſſiſt him, and ſoon became well again.

The Operation was perform'd thus:

Firſt ſtanding with his right Foot on the Connecting-line, coming from the Condenſing-phial— then, at bringing a Finger of the right Hand to the Apparatus, the Shock was given, and the Circuit of Æther continu'd from the Foot, the neareſt Way through the Body, to the Arm and each Finger; this was ſeveral Times repeated.

32. *Eliſabeth Toldervy*, Servant to Mr. *Squire*, in *Worceſter*:

Troubled for ten or eleven Years with an uncommon Diſorder, which ſhe call'd the Cramp: This began indeed ſomething like the Cramp, particularly in her Legs, but very ſoon ſeiz'd her in her Breaſt and Arm, in a different Shape; and was as follows:

After the firſt Beginning of the Fit, which was under her left Breaſt, it darted from thence to her Right, and back again to her left Breaſt and Shoulder; and then down to her Elbow, Wriſt, and Joints of her Fingers, which were inſtantly ſo contracted, that, if ſhe had not Time to catch up a Handkerchief, *&c.* to graſp in her Hand, the Nail of the Forefinger would oftentimes ſo wound the Thumb, during the Time of the Fit, as to cauſe the Blood to run down; nor could the Finger which thus wounded the Thumb be remov'd, till the Fit was gone off: The Elbow alſo was not only contracted, but that Contraction, in Conjunction with that of her Wriſt, twiſted and drew her Hand behind her, turning it up again to the ſame Shoulder: Thoſe Fits continued ſometimes, for near Half an Hour, with exquiſite Pain: The Times of Interval were very uncertain; ſometimes perhaps near a Month a-part, at other Times, twice the ſame Day.

The Force of the Contraction was ſo great, that it was out of the Power of two Perſons, ſtanding by her, to hinder the Arm from being drawn behind her, notwithſtanding they us'd their utmoſt Endeavours.

This inveterate Diſorder which would yield to no Medicine, ſoon gave Way to electrical Treatment, and in a few Weeks quite left her.

Operation. Firſt ſtanding on the Connecting-line coming from the Condenſing-phial, then, at bringing a Finger of the Hand affected to the Apparatus, the Shock was given, and the Circuit of Æther

ther continu'd from the Feet the neareſt Way, thro' the Body, to the Arm and Fingers; this was ſeveral Times repeated to each Finger.

33. *Suſanna Rea*, in *High-ſtreet*, *Worceſter*, troubled with a Bronchocele, for ten or eleven Years, which began on the right Side of her Windpipe, and gradually increas'd over it, till at laſt the Neck was eighteen Inches and an Half about, and the Swelling extended till it was more than half Way round it.

This Swelling was electris'd, and Sparks drawn from it once a Day for three Months or more, in which Time it was not only conſiderably leſſen'd, but, if the Muſcles were ſtrain'd by Coughing, or otherwiſe; remarkable oblique Channels were inſtantly form'd at the largeſt Place of the Swelling, as if one Part had been ſeparated from the other.

After this, thoſe electrical Operations were neglected for many Months, but ſhe has for more than three Months paſt attended again; and, now, inſtead of Drawing off Sparks as before, the Operations are perform'd by Way of Shocking, which appears to be the moſt effectual Method.

Swellings of this Kind are the moſt obſtinate of any I meet with, this having, in the whole Time, taken no leſs than ſix or ſeven Months, and the Cure not yet compleated; although the ſmalleſt Part of the Neck is now not quite thirteen Inches, and the largeſt Part about fifteen and an Half.

What Swelling remains, is at one particular Part only, and has, now, more of the Appearance of what it is vulgarly term'd — a Wen in the Neck, but is much more ſoft, and more looſe than it was at firſt, and appears to waſte much faſter, than at the former Operations.

34. Another Perſon troubled with the ſame Kind of Malady, but not of long Continuance,

has lately began with the ſame Operations; which Swelling abates much faſter than the former.

Operation. Let the Perſon take hold of the End of the Connecting-chain or Wire of the Condenſing-phial, and bring it to one Side of the Swelling, and lay one End of another Wire or ſmall Rod to the other Side of it, then guide the other End to the excited Apparatus, and it is done.

N. B. The Perſon always feels the Effects at the Part where the Fire comes out of one metallic Body into the Neck, and out again, at the other Part of the Neck, into the other metallic Body, *viz.* the Part where the Fire paſſes through even the leaſt Part of Air: Were it not for the violent Agitation it ſuffers by paſſing through the Air, there would, in all Probability, be no more Senſation at thoſe two external Parts, than at the other tender and ſoft muſcular Parts contain'd between thoſe two Parts.

DIALOGUE IV.

B. ARE thoſe Diſorders abovemention'd all that you have taken any Notice of?

A. Thoſe are chiefly what I took ſo much Notice of as to write down; a great Part of which were ſoon after I began theſe Experiments; for, although I at firſt determin'd to write down all that ſeem'd of any Conſequence, yet, through Hurry of other Buſineſs, it was neglected; the greateſt Part of which were rheumatic Complaints; this Kind of Treatment of the Rheumatiſm ſeldom fails in relieving young Perſons, particularly if took in Time; and, though many have been cur'd when farther advanc'd in Years, yet ſometimes it fails; and, what was very remarkable, a Man upwards of ſeventy-three Years of Age, having been very much afflicted for many Years, was conſtantly reliev'd by Electricity for the Preſent, and the Diſorder as conſtantly return'd, and generally the ſame Day; ſome others which receiv'd no Benefit, might perhaps, had it been longer continu'd; or perhaps fail'd for Want of better Skill in applying it: But I am ſo far from admiring that it does not always ſucceed, that I have much greater Reaſon to admire at finding it ſucceed ſo often, particularly at firſt Setting out; I having then no guiding Point to ſteer from, but public Papers, and thoſe always ſilent, as to the Way and Manner of the Operation.

B. Many of thoſe Caſes, which you have been relating, muſt be own'd to be very extraordinary; but, if they are not look'd on as impoſſible, yet will they be thought very improbable: For can it be ſuppos'd credible that any one Thing can have both a Power and Tendency to help in ſo many different Diſorders, particularly as the moſt ſalutary Medicine in Nature has never been known to be endu'd with ſuch wonderful Qualities; and that all this Power ſhould be found where there has by no Means appear'd ſufficient Reaſon to expect it? To ſay the Truth, the Suppoſition of ſuch an abſolute ſpecifical Quality in Electricity is look'd on by the moſt judicious Part of Mankind as merely chimerical, and as groundleſs, as to expect the pretended great Feats to be perform'd in Agues, by Charms; or the ſtill greater, by *Bridget Boſtic*'s Faſting-ſpittle: But, ſuppoſing you had ſome Reaſon to believe that you had no Way impos'd on yourſelf, yet Concluſions are by no Means to be precipitately form'd and ſettled; for thoſe cannot ſafely be made, but on the moſt mature Deliberation.

A. All this muſt be own'd to appear reaſonable, and I can't deny but I was much aſtoniſh'd and confounded myſelf, at ſeeing ſuch mighty Things perform'd by Electricity; I mean, before I could ſee any rational Principle to found them on: But after having purſu'd thoſe Experiments, and conſider'd the Nature of electrical Æther very attentively; its great Subtilty and Power, its active and enlivening Qualities, and its mighty Tendency to accelerate the Motion of the Fluids in general, and that of the Blood in particular; and eſpecially after having followed it ſo long as to diſcover it to be the very Æther, or moſt powerful ſubtil Medium, of Sir *Iſaac Newton*, and other eminent Philoſophers: Then, indeed, I began to think myſelf on firm Ground, and concluded that I had been ſo far from purſuing an *Ignis Fatuus* in the Bogs, that all thoſe ſurpriſing Effects were, probably, nothing but the neceſſary Conſequences of ſuch a moſt powerful Agent, when thus determin'd and directed to human Defects; I therefore apply'd myſelf with greater Aſſurance and much more Confidence than before; and the Succeſs which attended ſuch electrical Experiments, more and more confirm'd me in my Opinion, that this was one great End it was ordain'd to ſerve, after it had been thus fully and plainly diſcover'd to us; namely, that of helping in bodily Infirmities.

Having ſo much to found it on; join'd with ſo many ſucceſsful Experiments, and in ſo many different Caſes, as muſt neceſſarily offer in the Space of ſix or ſeven Years, for I refus'd the Trial to none, ſo that, had I wrote down all the Cures, both great and ſmall, that were this Way effected, they muſt have been ſufficient of themſelves to have fill'd a handſome Volume: It is therefore preſum'd they will not, after ſo much Experience, be look'd on as immature and raſh Concluſions, eſpecially as the ſame Succeſs, in many of the like Caſes, ſeems to be invariable; and to bid fair, particularly in Inflammations, and Swellings in general,

ral, and even in extreme Coldneſs of the Feet, for a Specific *.

In ſome longer Time, when we have ſeen ſuch Reaſoning and Experiments ſtill more confirm'd, we ſhall, in all Probability, be ſo far from thinking the whole electrical Phænomenon to be inexplicable, and the ſeveral Cures, perform'd by the Power of it, like ſo many Paradoxes; that it is preſum'd it will appear moſt rational to expect ſuch, or like Effects; particularly if the learned Gentlemen of the Faculty (whoſe peculiar Province it is to ſearch into the Nature and Cauſes of ſuch Maladies, and to apply a ſovereign Remedy to each) had Leiſure and Opportunity ſtrictly to examine into its Nature, Properties, and Effects; who might very probably ſoon be able, from a regular Proceſs of well choſen Experiments, to form ſo regular a Syſtem of practical Rules, as to be capable of judging in what Caſes it might prove a Specific, and in what Caſes not, eſpecially when they enter into their friendly Conſultations; for Want of which, I have admir'd, that, by being ſo injudiciouſly apply'd, it has not many Times been attended with real ill Conſequences.

B. Wherein do you imagine the ſpecific Quality of the electrical Virtue chiefly to conſiſt?

A. The Way and Manner in which it is obſerv'd to operate, when convey'd to the Fluids of the Body, is an admirable Tendency to promote a free Circulation, as is obvious by many of the above-mention'd Diſorders, where a too languid Motion was viſibly the Caſe.

Moſt, alſo, if not all Tumours, yield to this Kind of Treatment in a wonderful Manner; for, to ſay the Truth, I ſcarcely ever met with one ſo hard or ſtubborn, but what it either broke or diſpers'd, even though it were of the ſcrophulous Kind *: Other ſlighter and more recent Swellings are ſo ſoon and eaſily cur'd by Application of electrical Æther, as if not able to ſtand before it; as likewiſe Inflammations in as remarkable a Manner.

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* I have not had the Trial in many remarkable Caſes of the Cramp, but, *likewiſe*, in all *thoſe* which I have experienc'd, it never once fail'd me.

In a Word, not only the moſt common Diſorders, which are caus'd by an Obſtruction of the Motion of the Fluids in general, but even the Fluid of the Nerves in particular, whether it be the nervous Fluid of Anatomiſts, or this fluid Æther; for, where the moſt remarkable Numbneſs has happen'd, it has been almoſt inſtantaneouſly taken away by Means of Electricity, when timely apply'd; and when the like has happen'd, and been let alone ſome longer Time, I myſelf have made Uſe of it but twice, before it was cur'd: Palſies, alſo, when taken ſoon after their firſt Coming, often yield to this Kind of Treatment, of which there are not wanting a Number of Inſtances.

B. There was indeed great Expectation from Electricity in that very Diſorder, but now it ſeems to be entirely at an End, ſince the Account in the *Gent. Mag.* for *Nov.* 1755, which informs us of two paralytic Caſes, in the County Hoſpital, at *Shrewſbury*; in one of which it produced no viſible Effect, and, in the other, it twice rendered a partial Palſy univerſal?

A. That Account, I have Reaſon, as well as you, to believe was no ſmall Diſappointment to many eminent Phyſicians, who were in great Hopes and Expectation of, one Day or other, ſeeing the ſalutary Effects of Electricity in that particular Diſorder: Thoſe two remarkable Caſes you mention, appear'd juſt at a Time when I was trying the Effect of Electricity on a Perſon who had a Palſy in the Tongue, which had taken away the Uſe of it, as to render her ſo ſpeechleſs, as not to be underſtood.

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* If taken in Time, it ſeems to open the Obſtructions, by dilating the Paſſages, and accelerating the Motion of the Fluids; but, when let alone a longer Time, it brings them to a more ſpeedy Digeſtion than any other Means.

This Diſorder ſeem'd to yield to the very firſt Operation, and, after a few more, ſhe could ſpeak many Words intelligibly, yet, notwithſtanding it bid ſo fair for a ſpeedy Cure, ſhe neglected the Uſe of theſe Means all at once; but the before-mention'd Account in the *Magazine*, happening juſt at the ſame Time, ſo alarm'd, that I was not much at a Loſs for the Reaſon of her not venturing any more Trials.

I had been accuſtom'd to hear electrical Treatment of bodily Diſorders ſo banter'd, ridicul'd, and miſrepreſented, that I imagin'd there might probably be ſome unſkilful Management, Miſrepreſentation or the like, in that Account, if not downright foul Play; I was therefore determined to ſee, if poſſible, the Original, in the *Philoſophical Tranſactions*, from whence the Account was taken; and, to ſhew I was not miſtaken, I beg Leave to recite the Whole.

Article 94*th*, *Part* 2. *Vol.* 48, *of the* Philoſophical Tranſactions, *printed in the Year* 1754; *Part of a Letter from Dr.* Hart *to Mr.* William Watſon, F. R. S. *giving ſome Accounts of the Effects of Electricity, in the County Hoſpital, at* Shrewſbury.

SIR, *Salop, Nov.* 5, 1754.

" WE have try'd the Effect of Electricity in " many different Caſes, though I can't " ſay we have had much Succeſs in its Uſe, except

" cept in the Caſe of one Woman, whoſe left Arm " had been paralytic ſome Years, ſo as to be ever " abſolutely motionleſs, and ſenſeleſs of Heat, " Cold, or Pain, and remain'd ſo, notwithſtanding " all the Endeavours us'd to remedy it.

" This Perſon had her Arm electris'd frequently, and the Sparks drawn from it, and the " greateſt Blows given to it, for many Days ſucceſſively, whereby, in about eight or nine Days " Time, her Arm grew ſenſible of Pain and " Warmth, *&c.* and ſhe had ſome little Motion " of her Fingers, being able to graſp any Thing " with her Arm down, or before her; but ſhe " could not lift it up to her Head any better. This " encourag'd us to continue the Electriſing it three " Weeks or a Month longer; in which Time ſhe " had got ſome little Strength in her Arm, could " open and ſhut her Fingers, and lift it half Way " to her Head: But the Pain ſhe had from the " Electriſing, and the Fear that increas'd continually of new Shocks, made her obſtinately reſiſt uſing it any longer; and ſhe choſe, ſhe ſaid, " rather to remain *Paralytic*, than undergo ſuch " Operations any more; for which Reaſon, ſhe " was diſcharg'd out of the Infirmary, with ſuch " little Relief as above-mention'd, and I never " have heard more of her: I wiſh, indeed, ſhe had " try'd it a While longer, as it bid ſo fair to do " her Service: This was the only Caſe which " gave us any reaſonable Hopes from its Uſe."

Here it is preſum'd I may fairly ſtop, before I mention the other Caſe, ſo long at leaſt, as to appeal to the candid Reader, whether the Publiſher of that Account, as it ſtands in the *Magazine*, has ſhew'd himſelf an impartial Writer; or not rather ſome groveling Mortal, who imagin'd he had ſome private Intereſt that would be riſqu'd, if bodily Defects could be reliev'd by Means of Electricity;

otherwiſe he could never have endeavour'd to ſtifle the Knowledge of ſo extraordinary a Caſe, by telling the World *no viſible Effect was produc'd.*

Quære, Whether ſuch a Miſrepreſentation does not allow ſufficient Room to ſuſpect, that all which we find tranſcrib'd from the *Philoſophical Tranſactions*, on that Page and the next, (of the *Magazine*) was for the Sake of thoſe few Lines, in order to degrade Electricity; and that what we find relating to other Things, before and after, were only deſign'd as a Blind, or Skreen, to hide his Intention; otherwiſe, as above, what could be meant by publiſhing ſo great a Falſhood, as that it produc'd no Effect, when there appear'd the greateſt Probability of a Cure, in an otherwiſe incurable Diſorder, and which had continu'd not only motionleſs, but ſo dead, as to be inſenſible of Heat, Cold, or other Pain, for Years before?

Such Snakes in the Graſs have been no ſmall Hindrance to the Progreſs of electrical Treatment of human Diſorders, who are glad of taking all Opportunities to ridicule and expoſe it, or elſe endeavour to make it appear terrible, as in the above *Magazine*, to deter others from attempting Trials of that Kind; and, in order the more effectually to expoſe it, confidently deny, that any real Cure was ever effected by ſuch Means, and that, to their own certain Knowledge, never any Benefit was found at particular Hoſpitals, tho', they aſſured them, the Method had been often attempted; and then, with a grave Countenance, appeal to their own Underſtanding, whether they could think, that, by only Rubbing of Glaſs, Amber, or the like, any ſuch mighty Feats as were pretended to, were poſſible to be perform'd; and thus they plauſibly deceive thoſe who are not expected to know better.

Were there really no Deſign, the beſt Excuſe that can be made for thoſe mighty Pretenders to Reaſon, is, that they are as ignorant of the Nature and Properties of this ætherial Spirit, as thoſe they are reaſoning with; but, notwithſtanding this, it is preſum'd, they can't endure to be thought thus ignorant.

Theſe Things brought to my Mind what a certain Perſon, ſkill'd in Surgery, had obſerv'd to the young Lady, *Caſe the* 13*th*, when he ſaw the Cure in its Progreſs, taking ſuch ample Steps, and, perhaps, as he might imagine, almoſt compleated, (altho' it happen'd otherwiſe, on Account of the Relapſe, by her dropping the Uſe of Electricity all at once) *viz.* he deſir'd her to remember, that he had told her before, *Time* only muſt effect the Cure: But, ſurely, he had great Reaſon to believe, that neither *Time* only, or *Chance* only, was the Cauſe.

I muſt own, when I have been relating this Account, I could not forbear being ſo pleaſant, as to remark, how exceeding favourable *Time* was to the young Lady's Diſorder, while the Cure was attempted, by Means of Electricity, and how unfavourable when under any other Method of Cure.

B. Do you imagine the Editor of the *Magazine* would be guilty of ſuch a Miſrepreſentation of a Matter of Fact?

A. I am not willing, by any Means, to think him the Perſon, becauſe I ſee no End he could have in doing it; and it may reaſonably be ſuppos'd, when any Thing is tranſcrib'd from the *Philoſophical Tranſactions*, and ſent him, he expects ſomething very curious, and therefore inſerts it, without farther Examination.

The other Caſe, mention'd by Dr. *Hart*, was as follows;

" A young Girl, about ſixteen, whoſe right " Arm was paralytic, on being electris'd the ſe- " cond Time, became univerſally paralytic, and " remain'd ſo about a Fortnight, when the in- " creas'd Palſy was remov'd, indeed, by the Me- " dicines which her Caſe indicated; but the firſt " diſeas'd Arm remain'd as before: I ſhould have " mention'd too, that this Arm was greatly waſted " in Compariſon of the other.

" However, notwithſtanding the former bad Ac- " cident, I had a Mind to try the Effect of Elec- " tricity on her again, which we renew'd; and, " after about three or four Days Uſe, ſhe became, " the ſecond Time, univerſally paralytic, and even " loſt her Voice and Tongue, and with Difficulty " could ſwallow: This confirm'd me in my Opi- " nion, that the electrical Shocks had occaſion'd " theſe Symptoms. We therefore omitted it, and " the Girl, tho' ſhe grew better of her additional " Palſy, for ſo I call it, remain'd as bad as before " of her firſt."

It muſt be own'd, here does not appear the ſame Miſrepreſentation; yet, what ſerves his Purpoſe better; for here appears a Fact, exactly, as it were, adapted to his Liking, and very fit to caſt a Slur on what he was aiming at; but then here plainly appears ſomething like Want of ſufficient Skill in the Operator; and the chief Reaſon for my ſearching into the original Account, was, becauſe I imagin'd the Shocks given muſt be exceeding great, otherwiſe they could never have caus'd a univerſal Palſy; nothing being more likely to produce a Palſy, than the ſtrongeſt Blows that may be given by Means of Electricity, particularly, if the prepar'd Phial be enlarg'd to the Size of Mr. *Rackſtrow*'s; for then the whole nervous Syſtem might poſſibly be ſo ſhock'd, as to take away the Uſe of the Limbs of the ſtrongeſt Man living, and, by the Power of two ſuch Glaſſes, perhaps, to ſtrike him dead in an Inſtant: And, altho' we will not ſuppoſe any ſuch large Glaſs was made Uſe of in the above-mention'd Caſe, yet, the united Force of ſeveral ſmaller ones might, as effectually, take away the Uſe of the Limbs of the latter Perſon, who was, perhaps, at beſt, but weakly.

The Conſideration of theſe Things ought, at leaſt, to caution againſt ſhocking the whole Body, when only an Arm, *&c.* is affected; and, that the diſeas'd Arm only may receive the Shock, let that Part only of the Body be made a Part of the Circuit, as above directed, form'd for that Purpoſe, and then other Parts will be ſure to receive no Harm, were the Blows given ever ſo hard; and, in the promiſing Succeſs of the Perſon beforemention'd, who had a Palſy in her Tongue *, the Operation was perform'd after the ſame Manner, *viz.*

The Chain from the Condenſing-phial was brought to the Origin of the Nerves, at the hinder Part of the Neck; then, a Wire being laid to her Tongue, the Shock was afterwards produc'd, by bringing the other End of it to the hooked Leading-wire, or elſe to the Gun-barrel on which it was ſuſpended.

N. B. At ſuch Times as the Experiments are found to ſucceed beſt of all, and if there may be any Danger of having Shocks too great, in any particular Caſe, then it may not be amiſs to make Uſe of a four Ounce inſtead of an eight Ounce Condenſing-phial.

B. Why ſhould you think the Doctor's Indiſcretion was the Cauſe of the bad Effects mention'd in the latter Caſe?

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* Page 102.

A. You miſtake me; I don't, by any Means, think the Doctor to blame, who appears to have acted no otherwiſe than any ingenious and candid Enquirer, that had nothing more at Heart than the Health of his Patient; he relating the Whole in an impartial Manner, and expreſſing himſelf in a compaſſionate Way, and with no ſmall Concern at the Fooliſhneſs of the firſt of the two Patients, in ſo obſtinately refuſing to go thro' with what promis'd ſo fair for a Cure: But the electrical Operator did not ſeem to underſtand the Nature and Properties of it, at leaſt in the Cure of bodily Diſorders, otherwiſe he'd never have imagin'd, that the greateſt Shocks were the moſt effectual, in that or any other Diſorder, becauſe, if he underſtood it, he muſt neceſſarily have known, that they might be given ſo ſtrong, as greatly to injure the Body; and

Moderate Shocks are, for moſt Complaints, found to be of greateſt Service; thoſe which I make Uſe of in common, being what are deſcrib'd by many, rather as an Uneaſineſs than real Pain; and, in between ſix and ſeven Years Practice, I ſcarce ever met with any, who receiv'd Benefit by it, but were afterwards fond of it; then what Blows muſt be given to a Perſon to cauſe her ſo obſtinately to refuſe what had given ſuch a hopeful Proſpect of the Recovery of no leſs than a loſt Arm? But her Reaſon the Doctor gives in theſe Words:

" The Pain ſhe had from the Electriſing, and " the Fear that increas'd continually of new * " Shocks, made her obſtinately reſiſt uſing it any " longer:" And it muſt ſeem ſomething remarkable, that ſuch powerful Shocks ſhould ever do her ſo much Service as they did; which, had ſhe been of a weak Conſtitution, might poſſibly have render'd her as univerſally paralytic as the other.

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* Probably, new-invented Shocks, ſo as to have them ſtronger than ordinary.

As the Caſe of the Palſy in the Tongue, before-mention'd, afforded me not a fair Trial, I beg Leave, in this Place, to take Notice of a remarkable Caſe of the like Kind:

Edinburgh, *April* 18. A remarkable Inſtance of the Power of the electrical Aura has lately happen'd in this Place. *Robert Moubray*, who, in the Beginning of *January*, was ſtruck with a compleat Palſy of the Tongue, and, ſince that Time, entirely loſt the Uſe of his Speech; was taken into the *Royal Infirmary* ſome Weeks thereafter, where, by the Uſe of Remedies, he was, in a great Meaſure, reliev'd of other Symptoms that attended him; but, the Palſy of his Tongue remaining obſtinate, he was at laſt order'd, by the Phyſicians, to lay aſide the Uſe of all Medicines, that he might fairly try what Electriſing would do in ſuch a Caſe: Accordingly, laſt Week it was begun, and by *Saturday* he was able to extend and put out his Tongue, which, till then, had remain'd dead and motionleſs: On *Monday* he could plainly articulate a few Words; and, after repeating the Experiment on *Tueſday*, he ſpoke diſtinctly, to his own great Joy, and the Surpriſe of all who were preſent. *Gentlemen*'s *Magazine* for *April* 1751, Page 152.

B. Although you ſeem ſo poſitive, that if Gentlemen of the Faculty were to buſy themſelves in ſearching out the Virtues of this electrical Æther, and to apply it to Diſorders of the human Body, they would ſoon acquire ſuch a Knowledge of it, as to be able to perform great Things; yet have we not been ſufficiently inform'd to the contrary, by the *Gentleman*'s *Magazine* for *July* 1755? Are not there various Diſorders mention'd to have been treated by this Method, at the famous Hoſpital at *Upſal* in *Sweden*, by a Phyſician? Which Method of Treatment was continu'd for a conſiderable Time; and when he comes to his Concluſion, and ſums up the whole, it appears to be very inconſiderable, nay, even ſometimes it has actually done real Harm; and this Account, we are aſſur'd by the Publiſher, is of indubitable Authority.

A. That Account may poſſibly be very well atteſted, for which Reaſon, and ſome others, it may not be improper to enquire into the Particulars; I would firſt therefore take Notice of thoſe Diſorders, in which he allows it to have been of real Service; and then conſider of thoſe, wherein it has appear'd to be of little Effect, either the one Way, or the other; and, laſtly, of thoſe in which it was found to be really prejudicial.

Of bodily Diſeaſes and Maladies, in which Electricity has been found ſerviceable at Upſal *in* Sweden, *by Dr.* ZETZELL. Gent. Mag. *for* July 1755.

Of Contractions.

" ELectricity has certainly remov'd ſo many " Complaints of this Kind, as to deſerve be- " ing tried wherever the like occur.

1. " One who had loſt the Uſe of his Limbs, " from Cold, for ſeveral Years, was, at length, " quite reſtor'd by the Uſe of Electricity.

2. " Another, whoſe Knee-joint had been above " five Years contracted from a Rheumatiſm, was " able to ſtraighten it after twice Electrifying.

" But, in attempting the Cure of ſuch Diſorders " by this Method, it is of great Importance to " diſtinguiſh carefully which are the Muſcles that " are affected; for it is thoſe alone from which

" Sparks are to be drawn, and by no Means " from their Antagoniſts, which, on the other " Hand, ſhould be relax'd by warm Fomentations, applied for ſome Hours together, and afterwards anointed with ſome emollient Unguents. " At the Beginning of this Courſe, the Stomach " ought to be fortified with ſome generous Liquor, leſt the Matter remov'd from the Joint " ſhould be depoſited upon the nobler Parts *. " The electrical Shock is not near ſo efficacious, " as ſimply Drawing out the Sparks †.

In Deafneſs and Singing of the Ears.

3. " When Deafneſs ariſes from indurated Wax, " the Drawing off Sparks by an iron Stile will help " to diſſolve it, or, if the Deafneſs has follow'd a " Fever, it will promote the Digeſtion of the Metaſtaſis; but in a catarrhal Deafneſs, ariſing originally from a humid Air, and in Singing of " the Ears, all that could be done by Electricity, " turn'd to a very little Account.

In the Epilepſy.

4. " In ſome Epileptics, it has certainly been " ſerviceable; but if the Complaint was hereditary, or owing to a Fright, it did no ſenſible " Good or Harm.

In Felons.

5. " The electrical Sparks bring them to a " ſpeedy Digeſtion.

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[*] This Caution might very well have been ſpar'd.

[†] This is juſt according to the Situation of the Diſorder; if ſuperficial, then Drawing off Sparks is obſerv'd to be the beſt Way; but, if more deep, then Shocks are found to be moſt effectual.

In Ganglions.

6. " In the only three Caſes of a Ganglion, on " which Electricity was tried, it diſpers'd them " perfectly.

In the Tooth-ach.

7. " Where the Anguiſh was owing to hollow " Teeth, or from a catarrhal or ſcorbutic Habit, " it ſeldom fail'd of producing a perfect Cure, " though at firſt the Pain ſeem'd to be increas'd, " and rag'd for twenty-four * Hours, after which " it went off entirely. The Sparks ſhould be " drawn from the affected Tooth, by Means of " an iron Stile, † for a good while together.

In Palſies.

8. " The Commotion with the *Leyden* Phial has " been made with Paralytics here, without any " Benefit; nor were the Muſcles irritated, by drawing " Sparks from them, with any better Conſequence; " yet ſometimes, by Chance, the Pain " has been ſo ſevere on an otherwiſe inſenſible " Part, as to be hardly tolerable; and, when ſuch " Parts were once diſcover'd, the Sparks were " continually drawn from them alone: This was " repeated ſo often on a Citizen of *Upſal*, who was " a true Paralytic, that he was perfectly cur'd " thereby."

Of inveterate Head-achs.

9. Of confirm'd and inveterate Head-achs I never had much Experience; but, even in thoſe, he

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* Many are almoſt inſtantly cur'd, and I ſcarce ever remember any one that complain'd of its Raging for a Minute afterwards.

† A few ſmall Shocks, perform'd as at Page 131, are found to be much better.

takes Notice, that, where proper Internals were given at the ſame Time, the deſir'd Effect was ſpeedily produc'd.

In very bad Fits of the Head-ach, I have often made Uſe of Electricity, with ſurpriſing Succeſs; and the firſt Experiment I ever attempted, relating to Diſorders, was on one who had a continu'd raging Fit for a Fortnight, which was preſently cur'd.

N. B. In all the above-mention'd nine Diſorders, the Doctor allows Electricity to have been of Service, either more or leſs. But,

In the two following, he could not find it of any Benefit, nor does he charge it with doing any Harm.

Hyſterical Diſorders.

1. " In theſe it was never found to be attended " with the leaſt Benefit."

Amauroſis, or Gutta ſerena.

2. " In two Patients, the electrical Sparks were " drawn from the Parts near the Eyes, without " the leaſt Benefit; nor was the electrical Shock, " from the Phial, found to ſucceed better; ſo that " Electricity promiſes little in this Diſorder."

He likewiſe mentions two other Diſorders, in which it had but little Effect; but in thoſe I never had any Opportunity for Trials, namely, Coſtiveneſs and Agues.

In the three following he thinks it to be very prejudicial.

In the Sciatica.

1. " In ſome, the Pains have been greatly ap- " peas'd by Electriſation, but return'd again after- " wards; in ſome it was not at all abated; in o- " thers the Succeſs appear'd extraordinary at firſt,

" but after a few Days the Diſorder was turn'd upon the Inteſtines, with excruciating Torments.

In Rheumatiſms.

2. " What has been ſaid before, about the Sciatica, may be affirm'd of this Diſorder.

In the Gout.

3. " Pains of the Joints were frequently obſerv'd to ceaſe, by exciting the electrical Sparks; but then the gouty Matter ſeem'd to be repell'd inward, and produc'd Symptoms of more grievous Conſequence: So that it was often found, that, if this Application was continu'd, Pains of the Head, Vertigo's, Sickneſs at Stomach, and violent Gripings would take Place, which again diſappear'd, as ſoon as Nature was able to repel the morbid Matter back to the Joints. Some, under this Treatment, urin'd very plentifully, and fell into copious Sweats in the Night, which gave Hopes, that in Time the Obſtinacy of the Diſeaſe might be thus ſubdu'd; but Experience prov'd the contrary, the before-mention'd ill Symptoms all returning in a ſeverer Degree; ſo that all Hopes of Benefit to gouty Patients, from Electricity, are at an End."

GENERAL REMARKS.

I. *On Hyſterical Complaints.*

IN thoſe, tho' the Doctor never knew it of any Service, yet have we no ſmall Hopes, not only from Caſes 19th and 20th, but from other Trials already made (together with the Properties obſerv'd in this enlivening and vivifying Spirit) it is expected, that there are few Diſtempers, in which it will be found much more effectual; for as the moſt remarkable Property of the electrical Æther, in theſe Kind of Operations, is obſerv'd to be in raiſing the Spirits, by accelerating the Motion of the Blood, and other Fluids of the Body; ſo no Diſtemper can require it more *.

But, in this inactive Diſorder, it is not to be done by Halves; not for a few Minutes only, which is ſufficient in ſome others, particularly if it has taken deep Root; but the Perſon to be electris'd ought to ſtand or ſit on original Electrics for an Hour in the Morning, and another in the Evening, each Day: If two Hours each Day can't be comply'd with, let it be two Half-hours; this may be firſt practis'd, with ſometimes ſimply Drawing off Sparks; afterwards with ſome light Shocks, and, then if the Diſorder require it, to be increas'd with more: Such Proceedings I ſeldom found to fail of deſir'd Effects.

N. B. The ſalutary Effects of ſimply Electrifying appear to be produc'd by Reſpiration only; for a Perſon, being electris'd on the Reſin-cake, is ſo invelop'd in the electrical Æther, as neceſſarily to breathe much more of it than at other Times, and which as neceſſarily appears to accelerate the Motion of the Blood in general, prov'd by Mr. *Rackſtrow*'s *Experiment*, p. 67.

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* Some have objected, that to raiſe the Spirits by any artificial Means is of very little Service, any otherwiſe than for the preſent; and a Perſon is, many Times, obſerv'd to be the worſe for it afterwards: It is true, indeed, when they are raiſed by any Kind of ſpirituous Liquor, this is generally the Caſe; but when raiſed by this active Agent, that is, by accelerating the Motion of the Blood by Reſpiration, the Effects are much more permanent, and rather like the chearful Satisfaction, which we experience after the Hearing of good News. This Method of raiſing the Spirits will, in all Probability, be found much to exceed the only ſucceſsful Method beſides, which, perhaps, can be preſcrib'd in that inactive Diſorder, namely, bodily Exerciſe.

II. *On the Amauroſis, or Gutta ſerena.*

As to Diſtempers of the Eyes, I was never bold enough to engage with them, except in Inflammations, or the like, in which it generally ſucceeds; and, indeed, Inflammations of every Kind it is obſerv'd to diſperſe in a very remarkable Manner, moſt probably by dilating the capillary Paſſages, as well as ſeparating and dividing the clogg'd Particles of the ſtagnating Fluids, and removing the Obſtruction, by accelerating the Motion of the Blood.

This Operation is beſt perform'd by ſetting them on the Reſin, and drawing off the Sparks.

In Anſwer to what is ſaid concerning the Gutta ſerena above-mention'd, *viz.* that he could never obſerve the leaſt Benefit to accrue to the two unhappy Patients labouring under it; I muſt beg Leave to relate a particular Caſe of that Sort which happen'd at Home, and which appears to be of as unqueſtionable Authority as thoſe from *Sweden.*

Extract of a Letter from Mr. FLOYER, *Surgeon at* Dorcheſter, *to Dr.* BENT, *a Phyſician at* Exeter.

I HAVE lately had two or three Opportunities of trying the Effects of Electricity on paralytic Perſons with Succeſs: What moſt of all tends to prove its good Effect on the human Body, is the following Caſe:

A Boy, of about ſeven Years old, was taken blind ſuddenly in both his Eyes, without any previous Fever, Pains of the Head, or any other Indiſpoſition of Body, which one might reaſonably imagine to be the Cauſe of his Blindneſs. About 3 or 4 Days after he had loſt his Sight, he was brought to me for my Advice. Upon inſpecting his Eyes, I found the Pupil of each ſo entirely dilated, that I could not diſcover of what Colour the Iris was, not the leaſt Verge of it to be ſeen, but the Cornea, tranſparent, appear'd one continu'd black Spot. I aſk'd his Father, if he ever took Notice what Colour his Eyes were, before he loſt his Sight: He told me they were of a remarkable light-grey Colour. Upon ſhutting his Eye-lids, and rubbing them a conſiderable While, and then expoſing them ſuddenly to the Sun-beams, I could not perceive the leaſt Degree of Contraction in the circular Fibres of the Iris, and the Pupils remaining the ſame, whether the Eyes were open or ſhut, or whether in the Dark or Light; neither could he perceive any Difference when an opaque Body was interpos'd between his Eyes and the Light of the Sun, and when there was not: In ſhort, he was as blind as if he had had his Eyes cut out. I told his Parents, it was my Opinion he would never ſee again as long as he liv'd, for there was ſeldom or never a Cure for ſuch Diſorders of the Eyes, taking the Caſe to be a perfect Gutta ſerena in both Eyes, occaſion'd, as is generally imagin'd, by ſome Obſtructions in the Optic Nerve, and conſequently paralytic; I determin'd with myſelf to try the Effect of the electrical Shock upon the Lad, eſpecially as I had met with Succeſs in ſome Caſes before. Accordingly, I order'd him to be brought to me next Morning, when faſtening an iron Wire, coming from the Condenſing-phial fill'd with the Filings of Iron, to his Leg, and another round his Head, which Wire, after the Phial was ſatiated with the electrical Matter, I brought near the Conductor, and produc'd a ſurpriſing Snap, which ſtruck him backward, and made him cry out terribly, ſo that it was with the greateſt Difficulty we could perſuade him to repeat the ſame; but we at laſt prevail'd, and gave him three Shocks more. That Day he was put to Bed, and continu'd there till the next Morning, ſweating profuſely all the Time; but agreeably alarm'd his Father in the Morning, by crying out, he could ſee the Window. When he was brought to me the ſecond Time, I could perceive a ſmall circular Rim, of a light-grey Colour, round the Outſide of the Iris, and obſerv'd that he knew when I put my Hand between his Eyes and the Light of the Sun: This gave me great Encouragement to repeat what we had done the Day before. The next Day almoſt half the Iris could be ſeen, with ſome ſmall Degree of Contraction and Dilatation: The third Day he could diſcover and diſtinguiſh Objects: The fourth Day he could diſtinguiſh Colours, with a briſk Contraction and Dilatation of the Iris: The fifth Day, after repeating the Experiment, I obſerv'd the Iris to contract and dilate as well as ever; and, upon a ſtrict Examination, found the Boy's Sight perfectly reſtor'd, the Colour of the Iris the ſame as before he loſt his Sight, and the Eyes, in every Reſpect, as well as if no Diſorder had happen'd to them.

Dorcheſter,
May 23, 1751.

ANTHONY FLOYER.

To Dr. BENT, *in* Exeter.

WHEN I ſent you the Caſe of the blind Boy, I forgot to mention one Circumſtance, which was the Application of a Bliſter Plaiſter to the Nape of his Neck, the Day before he was firſt electris'd. As the Parents of the Boy importun'd me very much to do ſomething for him, this was the firſt Thing I thought on; but, after I had determin'd with myſelf to try the Effects of the electrical Shock, I never once thought of the Bliſter, till a Day or two after the electrical Experiments, when the Mother of the Boy deſir'd to know what ſhould be done to the Bliſter, for it was almoſt dried up. I told her ſhe ſhould take no farther Care about it, that it did not ſignify any Thing, and that I had forgot I had order'd it. Whether this Bliſter had any Share in recovering the Boy's Sight, or not, I will not take upon me to ſay; but I would not omit any one Circumſtance, which, if not mention'd, might perhaps, after it was known, occaſion a Suſpicion of an Impoſition.

I have got the Caſe atteſted by thoſe only who ſaw the Boy at firſt, and ſaw him electris'd every one of the Days; had the Satisfaction to ſee his Sight return gradually; and were Eye-witneſſes to every Circumſtance.

The Father has been examin'd by Hundreds to the Truth of it. The Boy is frequently ſent for by Gentlemen of the Country, when they come to Town, to examine him. In ſhort, every Body in this Part of the Country is ſatisfied of the Truth of it.

Since I wrote you my laſt, I have cur'd two Girls of Obſtructions, by the electrical Shock, one of whom took Medicines a Twelvemonth to no Purpoſe.

Yours, &c.

Dorcheſter,
Dec. 12.

ANTHONY FLOYER.

We whoſe Names are hereunto ſubſcrib'd, do certify, that one *William Clark*, a Boy of about ſeven Years old, of the Pariſh of *Fordington*, near *Dorcheſter*, was taken blind ſuddenly, and continu'd ſo five Days, by his Father's Account. We ſaw him examin'd by Mr. *Anthony Floyer*, Surgeon;

and by his Account, and by the Obſervations we ourſelves made, we thought him Stone-blind. He was electrify'd, five Days ſucceſſively, by Mr. *Floyer*, and the ſixth Day, on a ſtrict Examination, we were convinc'd he could ſee as well as ever he did in his Life, and his Sight ſtill continues perfect.

Jeremiah Clark, Father of the Boy.
Thomas Meech, M. D.
Dorcheſter, *Hubert Floyer*, Surgeon.
Dec. 11, 1751, *John Swabridge*, Apothecary.
Edward Stephens, Gent.
Arthur Mitchell, Gent *.

Remarks on the Gout.

WHAT he ſays of the Gout, is like what he has ſaid of the Sciatica, namely, that of repelling the morbific Matter inwardly, though with ſtill greater aggravating Symptoms.—And he concludes ;—ſo that all Hopes of Benefit to gouty Perſons from Electricity are at an End.

Anſwer. This is very diſcouraging to thoſe afflicted with Viſitations from that dreadful Gueſt ; I mean thoſe who experience it in the worſt Manner ; for, as to thoſe who are troubled with it in a leſs Degree, I am well aſſur'd it will yield to electrical Treatment, from the Trials I have made ; though they have been not ſo numerous as thoſe made in many other Diſorders ; the Reaſon, in ſome Degree, will appear farther on.

The World, in general, behold the ſurpriſing electrical Experiments with Aſtoniſhment, and are confounded at the amazing Phænomenon, yet are unable to form any Conception either of its Nature or Production.

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* *Supplement to Gent. Mag.* for 1751, p. 578.

3 But

But as this ſubtil ætherial Medium which was only conjectur'd by all former Philoſophers, is now fully diſcover'd to us; ſo we have an Opportunity put into our Hands of examining and enquiring into its Nature and Properties, by making almoſt what Number of Experiments with it we pleaſe.

And, notwithſtanding thoſe Philoſophers had no other Method of diſcovering ſuch a ſubtil Medium but by its Effects, yet ſo neceſſary and univerſal an Agent could not but appear remarkably plain, in thoſe Effects; accordingly they are obſerv'd to deſcribe it as exactly, as if they had been furniſh'd with the preſent electrical Apparatus, to arreſt, detain, and torture it with Experiments, in Order to render it viſible, and to diſcover wherein its great Strength and Energy lay; who accordingly inform us of its extreme Subtilty, Velocity, elaſtic or expanſive Power, as well as attracting and repelling Forces; all which Properties exactly agree with electrical Æther; and we find the ſagacious Sir *Iſaac Newton* goes ſo far as to pronounce it the mechanical Cauſe of animal Motion, as if firmly perſuaded, no nervous Fluid, or any created Subſtance, was endu'd with Power and Activity, ſufficient to perform ſo great an Office, but his ſubtil Fluid only.

If then muſcular Motion, that otherwiſe unaccountable Work of Nature, is perform'd by the active Power of this ſubtil Agent, we have no Reaſon to admire at finding in it a Power of accelerating the Motion of the Blood in an Animal, nor of dilating the Paſſages, which appear to be the principal Manner in which this healing Power operates; I ſay we have no Reaſon to admire that it ſhould accelerate the Motion of the Blood, when a more than ordinary Quantity is convey'd to the Body in general, if we only conſider the abovemention'd Experiment, which accelerates the Motion

tion of the whole Maſs of Blood, p. 67; and many of the Maladies before-mentioned plainly prove it to perform the like Office at particular Parts, or, at leaſt, what appears much like it, by dilating the Paſſages, and, at the ſame Time, ſeparating and dividing the clogg'd Particles, as before hinted; for otherwiſe we could not ſo conſtantly behold many Obſtructions ſo ſoon remov'd.

But as the greateſt Part of Mankind are ignorant of the Exiſtence of any ſuch neceſſary Agent, as Æther is allow'd to be; ſo they can form no Manner of Idea, how it is poſſible that this ſtrange Fire ſhould have either a Tendency or Power to heal, but are much rather inclin'd to believe ſuch Accounts to be trump'd up, or invented by artful and deſigning Men to delude the Heedleſs; theſe ſeem to be the chief Reaſons why the Treating of bodily Diſorders, in this Method, has not been more attended to, after ſo many well atteſted Accounts of its Uſefulneſs.

Another great Reaſon why it has been ſo diſregarded, is the great Pains which are taken by ſome others to expoſe and ridicule this Method of Treatment, and, at beſt, allow no more to it than to a common Quack-medicine, though there may be ſufficient Reaſon to believe it one of the greateſt of temporal Bleſſings ever yet diſcover'd to us, and perhaps the greateſt that human Nature is capable of; for, what is all the Riches and Honour in the World, or, indeed, what is Life itſelf, without Health to enjoy it?

Were it not for the above and ſuch-like Reaſons, even the Caſes 21ſt, 22d, and 26th would, in the Gout, in other Methods of Cure, be thought ſufficient Encouragement, at leaſt, to attempt the Trial.

I have had no more Trials of the Gout, but on thoſe who were ſlightly attack'd, and who receiv'd

Benefit ſo ſuddenly, that they could ſcarce think it the Effect of Electricity.

But there have not been wanting many Inſtances both from abroad and at home, where Electricity has been practis'd with great Succeſs on this Diſorder; and I am firmly perſuaded, that the inveterate and moſt chronical Diſorders of this Kind, even though hereditary, will, in Time, be found to give Way, if not quite conquer'd by this Method of Treatment: But, in making ſuch Attempts, great Caution ought to be obſerv'd, and by no Means attempted in the Violence of a Fit, but rather when it is entirely gone off; becauſe it is ſo much eaſier to prevent than to cure Diſeaſes: And, where it appears the moſt formidable, there to uſe the greateſt Caution, and to begin with ſimply Electrifying; that is, only to ſtand or ſit on the electrical Cake for Half an Hour, or an Hour, once or twice a Day; and, in ſome Time after, begin to draw Sparks, *viz.* cauſe the Fire to burſt at the Part or Parts affected; but no Shocks, excepting ſome few weak ones, for Fear of rouſing the Lion; and, whenever attempted, to obſerve the aforeſaid Caution, *i. e.* that the Wire or Chain coming from the Condenſing-phial be not brought to the diſeas'd Part, but a different Wire or iron Rod; and then to bring the other End of it to the excited Apparatus; by this Means, there will be no Danger of puſhing the morbid Matter inwardly, becauſe, then, the Motion of the ſubtil Fire is conceiv'd to be the contrary Way.

When any of thoſe Shocks are given, the Connecting-wire may ſometimes be held in one Hand, ſometimes the other, and ſometimes under the Foot; or, if the Coating of the Phial be touch'd with a Finger, ſtill the Shock will be produc'd, and the Fire paſs the right Way *: If it be requir'd to paſs through any particular Part, as of a Limb or Joint; let the Connecting-wire be brought to one Side of the Limb or Joint through which it is to paſs, and put one End of an iron Rod or Wire to the oppoſite Part; becauſe it moves through in a direct Line, from one metallic Body to the other, whenever the contrary End of the Rod is brought to the excited Gun-barrel, or any other Part of the excited Apparatus. But to return from this Digreſſion.

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* Outwardly from the diſorder'd Part.

In the foremention'd Account from *Sweden*, although the Doctor has taken Notice of ſo many Caſes wherein Electricity has been of real Service; yet, when he comes to what he calls his Concluſion, he ſeems willing to ſet it quite aſide, by concluding it like to prove of very little, if any, real Advantage to Mankind; I may therefore juſtly appeal to the candid Reader, whether or not he has ſhew'd himſelf an impartial Writer.

Surely! what nothing to be expected from that which he has found capable of performing ſuch great Things, and in ſo many different Diſorders! *viz.*

One having loſt the Uſe of his Limbs, for ſeveral Years, to be quite reſtor'd by the Uſe of Electricity.

Another, whoſe Knee-joint had been contracted for above five Years, from a Rheumatiſm, was able to ſtraighten it after twice Electrifying.

Ganglions, he ſays, all the Caſes in which it was try'd, it diſpers'd them perfectly.

A truly Paralytic, and Citizen of *Upſal*, was perfectly cur'd thereby.

In various Caſes of the Tooth-ach, it ſeldom fail'd of a perfect Cure.

In ſome Epileptics too, he ſays it has certainly been ſerviceable.

Deafneſs alſo in ſome Caſes.

And are all theſe promiſing Hints, if there were no more, like to prove of no real Service to Mankind? Are we to expect nothing from this partial Account, nor from all the more impartial Accounts, ſo frequently communicated from other Parts?

Does it not ſeem as if all he had ſaid, relating to its Uſefulneſs, was only what he was oblig'd to, by public Authority, rather than Inclination? Otherwiſe we ſhould never find him, in his Concluſion, ſo plainly endeavour to unſay all again; not once mentioning any real Good he thought it capable of, but does not forget to repeat what he had ſaid before, concerning its being prejudicial; and, even while he is relating any good Quality, he can't forbear uſhering it in, rather as the Contrary; particularly at his fifth Obſervation, where he ſays:

In all Caſes, a long Uſe of Electricity *brings on* a Coſtiveneſs, and an Increaſe of Appetite, moſt probably from promoting inſenſible Perſpiration: But this, if ever ſo true, muſt be ſo far from proving it prejudicial, that perhaps nothing can ſpeak much more in its Favour; at leaſt, a common Medicine, endu'd with ſuch ſpecific Qualities, would be not a little ſet by; even that of generally bringing on a Coſtiveneſs; were it only for its Uſefulneſs as an Antidote in oppoſite Diſorders.

Quære. Whether the moſt Healthy are moſt inclin'd to be coſtive or laxative? Becauſe the Coſtiveneſs he there ſpeaks of, may very probably be what only naturally ariſes from a more confirm'd State of Health, rather than any hurtful Quality in the Specific.

From the ſurpriſing Effects I have obſerv'd in Electricity, I have no Room to doubt, but that, if a Perſon were, before he made Uſe of Electricity, too coſtive, from ſome natural Diſorder; but that a long Uſe of it would even prove, in ſome Meaſure, an Antidote to that very Diſorder, which he ſays a long Uſe of it always brings on: And this, not from promoting inſenſible Perſpiration only, as he imagines, but chiefly from promoting a due Circulation, and the ſalutary Effects ariſing from it, as well perhaps ſenſible as inſenſible Perſpiration. And,

In a Word, the Cauſe of all the bodily Organs performing their proper Functions, and by that Means rendering the Body healthy; and I am not able to mention one Diſeaſe in which I think it would be prejudicial, excepting that of a Fever, where the Blood has already acquir'd a too great Celerity, and Electricity is not like to retard it; and, though I can't expect it to cure a Fever, yet I really believe a long Uſe of it would prevent one. But,

Surely, an Increaſe of Appetite is no bad Symptom, but rather a Confirmation of the above-mention'd ſalutary Effects, and that the digeſtive Faculty is improv'd.

How far this Account, from *Sweden*, concerning Electricity, apply'd to Diſeaſes of the human Body, will agree with the Account from *Sweden*, mention'd in the *Gentleman*'s *Magazine*, for *March* 1755, will appear by relating it.

A ſuccinct Account of Diſorders lately cur'd at Stockholm *by Electrification.*

THE Tooth-ach, if proceeding from a Defluxion of Rheum, is preſently aſſwag'd, or totally remov'd, by this Remedy.

A Gentleman of Diſtinction, who had been almoſt deaf a conſiderable Time with a Singing in the Ears, was cur'd in three or four Minutes.

A Man, 57 Years old, deaf for 32 Years paſt, from a Wound under the left Eye, and much afflicted with a violent Tooth-ach, was cur'd of this Complaint immediately, and, ſoon after, his Hearing, in a great Meaſure.

A young Man, of 22, who had almoſt loſt his Hearing for ſix Months, by violent Vomitings, which forc'd Blood out at his Ears, was cur'd in as little Time as the former, and continues to hear perfectly well.

A Girl of ſeven, born deaf, who conſequently could not ſpeak, began to hear Words ſpoken very loud in her Ear, and could repeat ſome of them in a few Days.

In the Year 1744, a young Fellow of 19 fell into a Well, and continu'd there above Half an Hour for Want of Help; ſince which Time his Hearing has been very weak; he has found much Benefit from being electrify'd, and, it is hop'd, will be perfectly cur'd.

A Stone-cutter, whoſe Knees and Joints of his Toes had been render'd ſtiff, and Fingers crooked, was able to go to Work after a few Days Electriſation. It has been found to recover, or greatly abate, all rheumatic Pains of the Muſcles.

A Lad, who had a ſevere Sciatica in the right Hip, from a Fall from a Scaffold, ſo as not to bear being touch'd, was cur'd in a few Days, ſo as to be able to walk without a Staff.

Another, who had us'd Crutches for ſeven Years, could walk without them in 13 Days, and burnt them for Joy.

A Girl of 13, who had been lame, after the Small-pox, from four Years old, now walks without a Staff, having been electrify'd no more than 20 Times.

N. B. All theſe Perſons were electriſy'd under the Direction and in the Preſence of the King's

Phyſicians, who attended by his Majeſty's Orders.

In this Account from *Sweden* appears ſomething like undiſguis'd Truth: Here we find no ſubtle Remarks and Concluſions, in order to unſay all again; here are no palpable Contradictions, no excruciating Torments, nor Bugbears, to deter the World, if poſſible, from making Experiments of this Kind; nor does it appear likely to produce any ſuch tremendous Effects, for, if ſo, we ſhould, long before this Time, have been thoroughly convinc'd of it, among ſuch a Number of Practitioners on human Diſorders, particularly at their firſt ſetting out; but, on the contrary, the good Effects were ſo obvious, and the ſalutary Hints exhibited were ſo many and plain, as rather to ſhew a neceſſary Tendency to heal, for otherwiſe no natural Reaſon can be aſſign'd for the applying it ſo early in the Morning, after its great Improvement, to thoſe Diſorders; and the many wonderful Cures, perform'd in this Way, ſtrengthen and confirm the ſame.

Theſe, and ſuch-like Conſiderations, are more than ſufficient to tempt us even to believe, that in all this the *immediate* Hand of God was preſent, particularly in the firſt Diſcovery to Profeſſor M. *de Muſchenbroek*; for that was the firſt Time it was ever known, or ſo much as ſuſpected to be endu'd with any great Power or Force; and ſcarcely any other Method could have inform'd him, than the Experiment he was then making: An Experiment ſo uncommon, and what muſt otherwiſe have appear'd ſo uſeleſs, that no one can imagine for what Reaſon he attempted it.

B. But, as you charge the Author of the latter Account from *Sweden*, *viz.* that of *July*, with downright Contradictions, it will be expected you ſhould prove them?

A. They are ſo obvious, as to require no other

Proof than what is to be found in his own Account, particularly at his Concluſion. Thus *Obſervation* 2d:

" In rheumatic, arthritic, and ſciatic Com-
" plaints, it is very ſeldom that any Advantage is
" gain'd, but rather the reverſe, from a Tranſla-
" tion of the morbific Matter inwards."

If the contrary was not well known, ſuch an Aſſertion from one who had had ſo much Experience, would have been ſufficient to deter moſt others that heard of it from ever attempting a farther Trial. But let us hear what he ſays himſelf, when ſpeaking of Contractions of the Joints: " Another, whoſe Knee-joint had been above five " Years contracted from a *Rheumatiſm*, was able " to ſtraighten it after twice Electrifying. ——— *Quæry*, What could have a much greater Appearance of a Miracle!

" One who had loſt the Uſe of his Limbs for " ſeveral Years, from a Cold, was, at length, " quite reſtor'd, by the Uſe of Electricity." *Quæry*, Are not Colds of this Sort allow'd, by moſt, to be of the *rheumatic Kind?*

Again, *Obſervation* 3d, " There is a great " Agreement between paralytic and rheumatic " Diſorders:" And yet he ſays, a Citizen of *Upſal*, who was a true Paralytic, was perfectly cur'd thereby.

Are not here Contradictions from his own Account? But, if more Proofs are neceſſary, take the following from his own Country.

In the above Account from *Sweden* of *March* 1755:

" It has been found to recover, or greatly abate,
" all rheumatic Pains of the Muſcles, and even in
" the Sciatica.

" A Lad, who was ſo ſeverely afflicted with it
" in the right Hip, from a Fall from a Scaffold,
" as not to bear being touch'd, was cur'd in a few

"Days, ſo as to be able to walk without a Staff." Altho' this is the very Diſorder, which the latter Author, for *July* 1755, affirms was turn'd upon the Inteſtines, with excruciating Torments; and who afterwards informs us, that what had been ſaid of the Sciatica, might be affirm'd of the Rheumatiſm likewiſe: But, if farther Proofs are ſtill requiſite, I might only appeal to all who have made Trials of this Kind, particularly in the Rheumatiſm: All ſeem thoroughly convinc'd of the ſalutary Effects of Electricity in this Diſorder; and great Numbers of the Cures, which the Public have been ſo often preſented with, have been rheumatic Complaints.

And, altho' in my Catalogue there are not many of that particular Diſorder, yet, perhaps, Perſons afflicted, and found Relief from Electricity, were five to one of any other particular Diſorder; not that I have ſo much Reaſon to believe it more effectual in relieving thoſe Complaints, than many others; but only, that more Perſons afflicted with the Rheumatiſm apply'd for Relief.

But, to ſay the Truth, the Author ſhould ſeem to miſtake the Nature and Properties of this ſubtil Medium, in adviſing what he calls ſimply Electrifying, by Drawing off Sparks with his iron Style, otherwiſe it ſhould ſeem natural to imagine, that ſuch a Diſorder as the Sciatica muſt lie too deep to be much affected with a Method ſo ſuperficial; but, when the electrical Æther is convey'd by the Method of Shocking, the deepeſt and moſt internal Parts are as eaſily pervaded as the moſt ſuperficial.

But, altho' Drawing off Sparks with an iron Style, or a Finger, is not ſufficient for this and many other Complaints, yet, in a great Variety of thoſe which are more ſuperficial, it is obſerv'd to be the only Method, and will be found exceedingly uſeful; as in moſt Kind of Swellings, not too deep, alſo Inflammations, Tetters, Ring-

worms,

worms, Shingles, St. *Anthony*'s Fire, Knots in the Fleſh, *&c.* and *Caſe the* 11*th*, altho' ſo remarkable, yet was no otherwiſe treated.

In Cramps alſo it is of Uſe, tho' more effectually cur'd by moderate Shocks: In cold Feet it ſeems to bid fair as a Specific, by conveying to them a Number of Shocks.

Either of theſe Methods are found uſeful in the Tooth-ach, but ſmall Shocks in this alſo will be found moſt effectual; being ſometimes inſtantly cur'd, at other Times not. The Method of performing the Operation is thus:

If it be an under Tooth, bring the End of the Connecting-wire under the Chin and Tooth, and lay the End of another Wire to the Top of the Tooth; then bring the other End of it to the excited Apparatus, and the Circuit will not only be compleated, but the electrical Æther will paſs the right Way: If an upper Tooth, bring the End of the Connecting-wire to the Top of the Forehead, as near as may be over the Tooth; then lay one End of the iron Style to the Bottom of the Tooth, and, at bringing the other End to the excited Apparatus on which the Phial is ſuſpended, the Æther, as before, will paſs thro' the Tooth.

Note, When any one performs this Experiment, or any other with the Phial, if they deſire the Shock to be ſmall, they muſt be ſure to touch it quick, for, the quicker it is touch'd, always the weaker the Shock; ſo that nothing is more eaſy than to leſſen or enlarge the Shocks.

That mercenary Views may not be thought the chief Motive of my ſaying ſo much in Favour of Electricity, I ſhould adviſe one of theſe Machines to be kept in moſt Families that have Conveniency, Opportunity, and Leiſure to make Experiments of this Kind; for, I am well ſatisfy'd, they would find their Account in it, ſo as to anſwer the ſmall Trouble and Expence: And, from the

Hints here given, any one might eaſily and ſoon become Maſter of Knowledge ſufficient to make a proper Uſe of it; for, if I were not thoroughly convinc'd of the Uſefulneſs of it, I ſhould have been very far from giving myſelf ſo much Trouble concerning it.

B. But, as you ſeem to be giving away the Art and Knowledge, which you have taken ſo much Pains to acquire, you will be far from being thought wiſe; and if there is, really, any Thing in what you have been ſo ſtrenuouſly pleading for, and if bodily Diſorders may be ſo eaſily cur'd, without the Help of Medicine, yet, you will not be thought good; becauſe, then, what muſt Thouſands do, many of which, having no other Way of maintaining themſelves and Families, than by dealing in Medicine only? Therefore, by endeavouring to propagate what you ſeem to think ſuch a general Good, you may, in Reality, be doing much Harm and Injury to your Neighbour; beſides, as you are ſo nearly related to ———, you don't appear to act the Part even of a prudent Parent.

A. But we muſt take Care not to loſe Sight of the grand eſtabliſh'd Maxim; which Maxim is according to the Law of God, of Nature, and of political Government; namely, that any private Emolument, or Advantage, muſt always give Way to that of the Public.

To apply this Maxim.

IF any Perſon was thoroughly perſuaded in his own Mind, that what has been ſaid concerning an univerſal healing Quality, in this electrical Fire, were true, and he ſhould think he had an Art beyond others, ſo as to make it generally uſeful; and, on the other Hand, he had ſome ſmall private Intereſt to riſque in publiſhing it:

The Queſtion is, if it could really be queſtion'd, whether that ſmall private Good ought to be put in Competition with ſo grand a public Good? And the Anſwer is obvious.

As to your grand Reaſon, that of ſacrificing a Part of the worldly Intereſt of one of the neareſt of Relations; this is the only effectual Means I have to ſhew you, that I am ſincere, and in good earneſt.

And, as I am ſo thoroughly convinc'd of its ineſtimable Value, ſo no worldly Advantage ought to be of any Weight, at leaſt ſo as to hinder me from endeavouring all in my Power to propagate the Knowledge I have acquir'd in that Way.

How common a Thing is it to hear many extolling ſuch a meritorious Act, as *a Man's Dying for*, or in *the Defence of his Country*, but more eſpecially when it is to *redeem* it from *actual Slavery?* This, by many, is thought ſo meritorious an Act, that it is a common Thing to hear even the Daſtard vaunt, that he ſhould think it one Degree of Happineſs to die in *ſo great a Cauſe*; which, if ſo, then what a moſt puny Hero? Hero, did I ſay! rather, what a moſt groveling Wretch muſt any one be, who would not, for the *common Good of all Mankind*, ſo much as riſque the leaſt Part of his temporal Intereſt!

CONCLUSION.

FROM the foregoing Conſideration of the Nature of reflected Motion, by Means of ſo complete Elaſticity in the Æther, or electrical Fluid aforemention'd, particularly when one of thoſe non-electrical Circuits is compleated, in order to convey the Shock *; it is reaſonable to conclude, that, notwithſtanding the pure Æther contain'd in the Body of the Animals, Metal, Water, *&c.* that compos'd it, be in Contact throughout the Circuit; yet the viſible Fire produc'd in the Phial is not ſuppos'd to move throughout, but only the contain'd Æther puſh'd forward, by Means of the elaſtic Force of the Fluid.

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* As at p. 41, 45.

To illuſtrate which, and to explain my Meaning,

I beg Leave once more to ſuppoſe, that a large Army of Men, on a large Plain, had form'd themſelves into a Circle by joining Hands, and the Shock convey'd to them all by Means of one of thoſe electrical Operations; there ſurely could be no more Reaſon for imagining the viſible electrical Fire, produc'd in the Phial, to be carry'd all round the Circle, and not rather ſtop before an entire Revolution be made; any more than there would be to conceive, that, if a ſolid Wheel of the ſame Circumference, (with its Axis perpendicular to the Horizon, could be made to turn quite eaſy and free on its Axis) muſt neceſſarily make a whole Revolution before the Power, and conſequently the Motion, was at an End; but muſt rather, long before a Revolution was compleated, neceſſarily make an entire Stop, notwithſtanding the moſt violent projectile Motion that could poſſibly be communicated to it.

What ſeems to confirm this, is, Mr. *Watſon*'s Obſervation on large Circuits, who informs us, that the Fire and Exploſions at the Machine, *viz.* at the utmoſt Extremity of the Connecting-line, were very ſmall in Appearance, notwithſtanding the Shocks were as ſenſibly felt by thoſe who form'd thoſe large Circuits, as by thoſe that form'd the leſſer ones.

On the contrary, when a Piece of Wire, or iron Rod, is only brought from the Coating of the Phial to the Leading-wire, or elſe to the prime

Conductor on which it is generally ſuſpended; the actual viſible Fire, *viz.* the Viſibility generated in the Phial, ſeems then continu'd quite thro' it in a Torrent, and an exceeding bright Ball of fierce Fire burſts forth at the End of it.

Thoſe two Experiments concerning the largeſt and ſmalleſt Circuits, when compar'd and conſider'd, ſeem plainly to confirm what has been ſaid of the Courſe ſteer'd, or the Way the electrical Æther moves from its State of Confinement in the Phial; and not only indicates, that ſuch Motion is from the Body of the Phial and leaden Caſe, along the Connecting-line, as at *p.* 44, by obſerving ſo ſmall an Appearance of Fire at the other End of it, in the large Circuits, and the great Quantity exhibited thro' the ſhort Circuit, or Connecting-wire; but alſo, that the momentary Motion is propagated, or reflected, as ſuppos'd at *p.* 27; and thus the greateſt and leaſt Circuits are, in Appearance, perform'd in the ſame Space of Time ——— So that it ſeems moſt natural to conclude, that, by Means of that violent Percuſſion in the Phial, a Circuit is no otherwiſe perform'd than this, *i. e.* however great the Stroke or Impulſe at the Phial may be, the ſame Violence is reflected throughout the whole Circuit, altho' the actual Fire, which, when the Room is darken'd, we always behold in the Phial, is by no Means continu'd throughout, but all that appears to be perform'd as a Circulation, is the removing each Part of the Circuit or Column of Æther, contain'd in thoſe Pores of the denſe Non-electrics which form'd the Circuit, more forward every Time a Shock is given, or Percuſſion in the Phial is repeated, than it was the Time before.

That it makes not an entire Revolution, at every Exploſion or Flaſh in the Phial, that is, every Time a Shock is repeated, is what may alſo be reaſonably ſuppos'd, by obſerving that the ſmalleſt and greateſt Shocks are equally propagated to any Diſtance, and, though ſometimes ſo ſmall as not much to exceed even a ſtrong Pulſation of an Artery, yet will it be as inſtantaneouſly reflected throughout a large Circuit, as when they are ever ſo ſtrong.

Theſe are ſuch Reaſons as induce one to believe, that when a Circuit is form'd, in order to convey the electrical Æther, by Way of Shocking, to any Malady in the human Body, particularly, ſuch as *Caſe the 14th*, where the Fire was guided quite through the whole Body; it may not be the ſafeſt Way to truſt to one or two Shocks only, for that may, perhaps, be only removing the ſtagnant Æther from one Part of the Body to another, which Method, in all Probability, cannot be ſo eligible, nor the Æther ſo ſalutary and enlivening, as if moderate Shocks were oftener repeated, and the active Spirit, or electrical Æther, were ſure to move not only through the Part affected, but alſo that, by this Means, ſuch ſtagnant Æther may be diſplac'd and driven quite out of the Body by the new; and thus this Manner of Treatment of bodily Diſorders appears to be moſt rational; the Want of the Knowledge of which has been none of the leaſt Reaſons why ſuch a Method of Treatment has not made a greater Progreſs, but inſtead thereof been much banter'd, ridicul'd, and ſet at nought. And,

As there are many Things in Nature, which we find to have a Power to fix this Principle; ſo there is ſufficient Reaſon to believe it is often, in ſome particular Conſtitutions, detain'd, and ſo fix'd, as to hinder and impede a free Circulation in general, and at other Times, in particular Parts, ſo fix'd, as to be the Cauſe of the very worſt of Diſorders, ſuch as Cancers, ſcrophulous Tumors, and the like, which appear ſo very ſtubborn as to yield to no Medicine ever yet diſcover'd.

If ſuch Diſorders, when the Obſtruction firſt began, were to be treated by this Method; from what has been already obſerv'd, there don't appear to be any Doubt of an abſolute Cure.

And although, when other Means have been formerly us'd for accelerating the Blood in ſome dangerous Caſes of Obſtructions, ſuch as Mortifications, *&c.* they have prov'd ſo far from relieving, that they have very much heighten'd and increas'd the Diſorder; yet this was never found to be the Caſe, even in that particular Diſorder; when the Motion of the Fluids has been accelerated by Electriſation; for which Reaſon, it may be naturally ſuppos'd, that the electrical Æther not only accelerates the Motion of the Fluids, but alſo dilates and opens the Paſſages, as well as ſeparates and divides the clogg'd * Particles of the Blood, and other Juices, that ſo the Circulation may be again carried on.

And, as there are few general Rules without their Exceptions, ſo no Doubt but this may be, ſometimes, found true here alſo in ſome Degree, and it may very poſſibly appear from the Effects, that the Acceleration of the Fluids may be, ſometimes, too quick for the Dilatation and Opening of the more ſolid Parts, and in ſuch Caſes it may be ſuſpected to cauſe Pain for the preſent †: And this might very probably be the Reaſon, that the Gentleman mention'd, *Caſe the* 12*th*, complain'd of more Pain, though it was attended with no other bad Symptom; yet this, however, ought to teach us to proceed with the more Caution in violent Pains, particularly thoſe of the Head in general, and of the Ears or Eyes in particular, as being ſome of the moſt tender Parts; for thus proceeding, in a more cautious and light Manner, may not only be the ſafeſt Way, but the moſt effectual in many Caſes, though ſomething longer in performing.

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* As at Page 122.

† In Burns this ſeems to be the Caſe, by much increaſing the Pain.

B. But you are not ſure, that the Operation is perform'd this Way?

A. I am as ſure, as Reaſon and Experiment can make me, and therefore it is preſum'd it muſt reſt here, till a more plauſible Reaſon, ſupported with equal Experiments, can be produc'd to ſhew the contrary.

Diſorders in general, that lie near the Surface of the Body, ſuch as Inflammations and Swellings of moſt Kinds, are effectually cur'd by only ſetting them on the Reſin, and ſimply Drawing off Sparks from the affected Part; and not only ſo, but oftentimes Swellings that extend to ſome Depth: I have alſo found it to have very ſalutary Effects, even when a Perſon has only ſtood on the Floor, and brought a diſorder'd Part, as a Hand, Finger, *&c.* to the excited Gun-barrel, or other Part of the Apparatus; and this is ſo eaſily accompliſh'd, that a Perſon is, many Times, able to perform an Operation on himſelf, without any Aſſiſtance.

This laſt Method I have often practis'd with good Succeſs, and never found any ill Conſequences attend it: The Reaſon why I don't practiſe it more conſtantly is, becauſe, by this Method, the Direction of the electrical Matter is, from the excited Gun-barrel or Wires, inwardly, thro' the Malady, *&c.* and from thence, thro' the Body, into the Earth.

The Danger, if there were any, of ſuch Power or Force repelling or puſhing the morbific Matter inwardly *, muſt be entirely avoided by the other Method of Drawing Sparks from the Malady, while the Perſon is electris'd on the Reſin; becauſe then the Courſe and Direction of the electrical Æther is thro' the Patient's Hand, which communicates with the excited Apparatus while on the Reſin, and from that Hand the neareſt Way thro' the Malady, outwardly, and from thence thro' the Wire that draws off the Sparks, and thro' the Operator into the Earth, by *Experiment the 2d.* But

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* Page 114.

I have elſewhere ſhewn, that there does not appear the leaſt Probability of any ſuch tremendous Effects from Electricity as are pretended to, particularly with an iron Style, nor while we confine ourſelves to ſuch ſmall Condenſing-phials; and have alſo ſhewn, in a Variety of Caſes, that the Way and Manner in which the electric Virtue appears to operate, is in a powerful Tendency to promote a free Circulation of the Fluids of the Body in general; yet, when the active Agent is convey'd to the Malady, then it appears to be determin'd to that Part only; and I can't help repeating it again, that, were not the ſolid Paſſages dilated, as well as the clogg'd Fluids diſſolv'd † by this ſubtil Principle, no probable Reaſon can be aſſign'd for thoſe ſalutary Effects ſo ſpeedily produc'd in ſo many different, and, otherwiſe, obſtinate Caſes.

And altho' Diſorders that are more conceal'd, and lie farther from the Surface of the Body, as Rheumatiſm, Sciatica, Pains of the Bones and Joints, *&c.* are more effectually cur'd by ſending the electrical Æther thro' the Parts by Means of Shocking them; yet, Pains of the ſmall Joints, as of the Fingers, *&c.* are many Times cur'd, by only ſimply Drawing off the Sparks at thoſe Parts while electris'd on the Reſin.

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† Pages 116, 122.

N. B. Having, while in *London*, the Pleaſure of ſeeing the ingenious Mr. *Watſon*, I was giving my Opinion concerning the Way and Manner in which this active Principle operates, when we behold ſuch ſalutary Effects, by applying it to the Cure of bodily Diſorders; and told him I had great Reaſon to believe it to be perform'd by accelerating the Motion of the Fluids of the Body; and what the more confirm'd my Conjectures was, its great Propenſity of accelerating the Motion, in general, of Fluids already in Motion.

He told me it was queſtion'd whether the electrical Fire really accelerated the Motion of the Fluids or not; and that, if the Experiment of the capillary Syphon were accurately made both Ways, the Water, diſcharg'd in a given Time, would perhaps be found equal; that is, whether it were electris'd and flow'd in a Stream, or whether it were not electris'd, and mov'd off gently in large Drops, yet the Quantity might be equal: This being what I had never tried, I could ſay but little to it.

But ſince, reflecting on thoſe two Experiments, I conſider'd, that ſuppoſing Mr. *Watſon*'s Conjectures were granted, and the Quantity of Water evacuated by the Syphon in a given Space of Time was equal in both Caſes; yet the Greatneſs of the Activity of the Water which appears at the End of the Syphon, when the Water is electris'd, beyond what is to be ſeen before, muſt be abundantly ſufficient to inform us, that the real Motion of the Water is thereby greatly accelerated: Whether a greater Quantity of Water be actually diſcharg'd in the ſame Time, ſeems not very material, but whether the Motion be really increas'd; that is, whether the Motion be not greater when it moves violently off at the End of the Tube in Streams and flying Particles, than when it has no other Power of moving from it than that of its own Gravity; inſinuating, as it were, almoſt inſenſibly from the End of the Tube. Hence, *Quæry.* Whether the beholding the ſame Quantity of Water ſo very much ſeparated into active little Streams, and flying Particles, from the End of the Syphon, may not reaſonably be ſuppos'd to favour my former Conjecture; namely, that, by conveying the electrical Fire to a human Malady, the clogg'd Particles of the Fluids are thereby ſeparated, by which Means they become fitted to paſs thoſe Canals which before they were thus ſeparated, they were incapable of doing.

POSTSCRIPT.

TO ſhew I am not miſtaken, when I affirm, *Experiment the 2d*, that the Æther is paſſing thro' the Apparatus of Wires and Perſon into the Earth, all the Time he touches it with a Finger while ſtanding on the Floor, altho' at the greateſt Diſtance from the Machine in Motion, and altho' no Senſe informs him of it:

Let one End of a Piece of Wire be well coated with Sealing-wax, and, if a Perſon hold it by the coated Part, no ſooner is the other End of the Wire laid on the excited Apparatus, but the Thumb and Fingers are ſenſible of it; and, if held but lightly, the Eye alſo, for it will dart violently thro' the Sealing-wax to the non-electric Fingers all the Time; ſo great is its Propenſity of returning into the Earth.

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FINIS.

ERRATA.

At Page 38, Line 28, inſtead of p. 34 and p. 58, read p. 19 and p. 37; and at Page 39, Line 25, inſtead of p. 48, read p. 29.

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